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WORK PLAN

TWENTYFIVE MILE STREAM WATERSHED



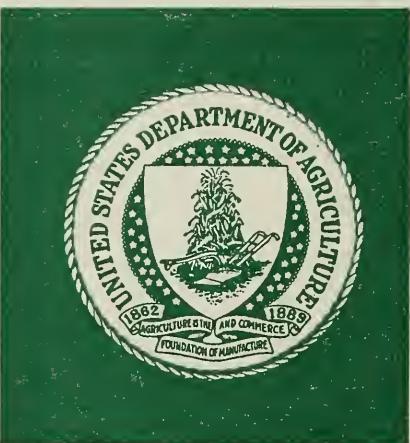
WATERSHED PROTECTION
AND FLOOD PREVENTION

DECEMBER
1975

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NOTICE

References to the Maine Department of Inland

Fisheries and Game should read "Maine

Department of Inland Fisheries and

Wildlife," since the name was changed

after the typing of the majority of this

document.

U. S. DEPT. OF AGRICULTURE
NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

NOV 20 1978

CATALOG

ADDENDUM

TWENTYFIVE MILE STREAM WATERSHED WORK PLAN

Waldo, Kennebec, Penobscot, and Somerset Counties, Maine

INTRODUCTION

This addendum was developed in accordance with phase-in procedures agreed to between the Water Resources Council and the USDA, Soil Conservation Service, for Level C Plans for which field studies, analyses, and evaluations were completed as of October 25, 1973, and which have been formulated in accordance with Senate Document 97 as supplemented and amended, and which are to be transmitted to the OMB between July 1, 1974, and June 30, 1976. This addendum consists of three sections. The first section contains the Discount Rate - Benefit: Cost Comparison, the second section contains an Abbreviated Environmental Quality Plan, and the third section contains a Display of Accounts for the Selected plan.

SECTION 1

Discount Rate - Benefit: Cost Comparison

The selected plan was evaluated using 6 7/8 percent interest rate, 1974 prices for installation cost, and current normalized prices for flood prevention and secondary benefits. See Tables 4, 5, and 6 of the work plan for greater detail.

Using the current (12/75) interest rate of 6 1/8 percent and the same basis for installation costs and benefits as for plan development, the ratio of average annual primary benefits (\$91,450) without the inclusion of local secondary benefits, to the estimated average annual costs (\$54,340) is 1.7:1.0. The total average annual benefits, including secondary benefits, are \$97,500. The benefit-cost ratio is 1.8:1.

SECTION 2ABBREVIATED ENVIRONMENTAL QUALITY PLANEnvironmental Concern

The Twentyfive Mile Stream Watershed, 92,637 acres, is located in northern Waldo County with small portions in Kennebec, Penobscot, and Somerset Counties. Two relatively different topographic areas can be observed in the watershed. The area east and southeast of Lake Winnecook is typified by rolling hills up to elevation 960 feet. The area west of Lake Winnecook is a low, flatland area with a maximum elevation of 300 feet. Land use in the watershed is presently 79 percent forest land, 17 percent crop and grass land, and 4 percent miscellaneous, such as urban areas, bodies of water, streams, etc. Cover conditions for these lands range from fair to good.

The watershed is comprised of a number of streams and brooks which flow into Lake Winnecook. Carlton Stream originates in the northern portion of the watershed at Carlton Pond and flows in a southerly direction into Lake Winnecook. The major tributary, Sandy Stream, starts in the southern portion of the watershed at Sandy Pond and flows in a northerly direction through the towns of Freedom and Unity and finally into Lake Winnecook. Twentyfive Mile Stream, originating at the outlet of Lake Winnecook, flows in a northwesterly direction for about five miles and joins the Sebasticook River at Burnham Village. The outlet and the major inlet of Lake Winnecook are near the same location.

Lake Winnecook (2,230 acres) is the largest body of water in the watershed. Other ponds include Carlton Pond (430 acres), Sandy Pond (430 acres), and several smaller ponds and flowages. Stream gradients are low to moderate in the northern and western portions and are moderately steep in the southern and eastern portions of the watershed.

In general terms, the watershed can be described as a quiet, rural, New England setting. There are about 420 farms scattered throughout the watershed which average approximately 200 acres in size. A network of rural roads serves the farms and woodlots. There are approximately 1,070 landowners in the watershed, of which about one-third are absentee landowners.

Public land within the watershed consists of about 2,885 acres. The town of Troy controls about 1,350 acres and the State of Maine administers about 1,500 acres as a game management area in the vicinity of Frye Mountain on the southern watershed divide and a five acre boat launching site on Sandy Stream. Unity has 30 acres in public ownership.

The lakes and streams of the watershed provide opportunity for warm and cold water fishing. Halfmoon and Sandy Streams have been stocked, but fishing is now supported solely by natural populations of brook trout. Twentyfive Mile Stream is considered marginal trout water because of

warming and low summer flows; however, it does support seasonal brook trout and a warm water fishery, primarily of smallmouth bass.

Lake Winnecook, Carlton Pond, and Sandy Pond are the major natural bodies of water in the watershed. Lake Winnecook supports a warm water fishery of smallmouth bass, largemouth bass, chain pickerel, white perch, yellow perch, and American smelt. The major fishery activity on Carlton Pond is ice fishing for yellow perch and pickerel.

Fishing pressure in the watershed is considered light to moderate and is concentrated on Lake Winnecook. Twentyfive Mile Stream receives light fishing pressure. There is a boat ramp on Sandy Stream about one mile upstream from its confluence with Lake Winnecook. Lake Winnecook is unobstructed for boat use. Twentyfive Mile Stream and the lower part of Sandy Stream offer quiet and scenic canoeing waters.

The watershed area contains a variety of wildlife habitat conditions. At the outlet of Lake Winnecook, there is a deep fresh marsh of about 200 acres. Local residents report heavy seasonal use by waterfowl for nesting in the spring and as a stopover during fall migrations. Excellent duck hunting is reported on this area, especially for black duck, wood duck, teal, and goldeneye. Other favorable waterfowl areas are located along the Sebasticook River, and on Carlton Bog, which is a waterfowl production area owned and managed by the U. S. Fish and Wildlife Service. Off Prairie Road, about 800 feet north of Route 139 and on the west bank of Sandy Stream, there is a 50-acre cornfield which serves as a major feeding area for waterfowl in the immediate area.

The watershed area is considered by some fish and game personnel and local residents to be one of the best fur producing areas in Maine, especially for muskrat, beaver, and otter. Fisher, mink, fox, and raccoon are also heavily trapped in the watershed.

Whitetail deer, ruffed grouse, woodcock, and snowshoe hare receive moderate to heavy hunting pressure throughout the watershed. The best habitat for these species is located along the streambanks and disturbed areas where hemlock and aspen diversify the vegetation.

The forest, fish and wildlife, and associated resources of the watershed and general area are important to residents as a good place to live and as a source of income. The resources are important to visitors from outside the area for an opportunity to view, enjoy, and relax. Continuous and increasing pressure for use of the resources creates problems and underlines the need for wise management, protection, enhancement, and preservation for future use.

About 1,700 acres have been identified in the 100-year flood plain adjacent to Lake Winnecook and Twentyfive Mile Stream. Lake Winnecook is a major area of vacation and seasonal homes. Land use in the flood plain adjacent to Lake Winnecook and Twentyfive Mile Stream includes 163 camps and cottages, some recreation property, three bridges,

and one and one-half miles of road as urban land use, and 180 acres of agricultural land. The remainder is in bottom land hardwoods and swamp.

Vacation and seasonal homes are subject to flooding from storms on approximately a 5-year frequency. Approximately 280 property owners on Lake Winnecock are directly affected during periods of high water. This includes: flooded septic tank's effect on water quality, the fluctuating water level's effect on the fish and wildlife resources, and deterioration of land and water resources. The fluctuating water level has a detrimental effect on 25 acres of fish spawning area and approximately 250 acres of waterfowl habitat.

Development in the flood plains of the watershed needs to be limited to the present area and new development directed out of the flood zone and onto areas best suited for the purpose. The current land and water quality problems resulting from improper land use and associated high water problems need to be reduced if not eliminated.

Objectives

The primary objectives of the Abbreviated Environmental Quality Plan are two-fold. The first is: to enhance the quality aspects of water and land by control of pollution and prevention of erosion in order to harmonize land use objectives in terms of productivity for economic use and development with conservation of the resources throughout the watershed. The second objective is: by means of management, protection, and enhancement, to maintain and improve the areas of natural beauty, streams and lakes, shores, and wetlands throughout the watershed.

Formulation of the Abbreviated Environmental Quality Plan

Coordination: The sponsors, interested local groups, state agencies, and U. S. Fish and Wildlife Service have expressed environmental concerns for this watershed during formulation and development of the selected plan.

Formulation: The land treatment phase of this plan will satisfy environmental concerns of land and water quality problems on watershed lands.

The second objective to preserve, manage, and enhance the areas of natural beauty, streams, lakes, and shores of the flood plain by proper land use planning throughout the watershed was of major interest because of the problems created by improper land use and development in the flood plain adjacent to Lake Winnecock. This interest creates a need for accelerated resource information inventories for proper land use planning. This plan calls for soil surveys, land use planning, and flood plain management programs.

The environmental problems associated with the encroachment in the flood prone area adjacent to Lake Winnecock are related to degradation of land quality and aesthetics, and to water quality from inoperable septic systems.

Other watershed problems include hazards to motorists due to flooded roads, lack of adequate public access to water-based recreation, and lack of recreation facilities.

Many ideas of how to improve the land and water quality in the flood plain area were generated. For example, since encroachment onto the flood plain occurred with prior knowledge of the flood hazards, the property owners should take the responsibility for possible loss of property, be required to move out of the flood zone, or contract for flood insurance. However, the alternatives of the owners being responsible for property loss, estimated at \$51,000 annually, or the acquisition of flood insurance, estimated at \$13,200 annually, does not enhance land or water quality, but precipitates the degradation of the complete resource. The remaining alternative of requiring the property owners to move out of the flood plain was estimated to cost \$900,000. It does not appear that the towns presently have the legal authority to require camp owners to move from the flood plain.

Abbreviated Environmental Quality Plan

The Abbreviated Environmental Quality Plan includes two parts: watershed land treatment and flood plain management, and land use planning.

The land treatment phase of this plan includes adequate treatment of 2,282 acres of cropland, 7,842 acres of grassland, and 17,200 acres of forest land. The planned treatment of 27,324 acres will be the applicable soil and water conservation measures such as diversions, conservation cropping systems, contour farming, crop residue management, ponds, obstruction removal, grassed waterways, and subsurface drains for cropland. The combinations and alternative land treatment measures planned for grassland to be treated include pastureland and hayland renovation, and ponds; forest land measures include tree planting, hydrologic cultural operations, and skid trail and logging road control. The time required to install the land treatment measures is five years.

Technical assistance for planning and application will be provided by the Waldo County Soil and Water Conservation District, the Soil Conservation Service, and the Maine Bureau of Forestry in cooperation with the U. S. Forest Service. Each existing conservation and woodland plan would need to be reviewed or revised, and in some cases, new plans developed. Technical assistance will also be needed to develop and interpret soils and other resource information, and to present and explain this information to regional planning agencies, town planning boards, town developers, and others to guide land use in accordance with its hazards, limitations, and capabilities. To accelerate the rate of application of land treatment will require 11 man-years of additional technical assistance.

Included in the nonstructural phase of this plan are land use planning and flood plain management. As a result of the soil survey and production of flood plain delineation maps, the towns will have the

basic tools necessary to establish land use regulations in the watershed. The towns are currently responsible for the approval of all new developments adjacent to all classified bodies of water, in accordance with the mandatory Shoreland Zoning Law as adopted by the State of Maine Legislature. The Shoreland Zoning Law requires that the towns must zone all land within 250 feet of normal high water mark on all classified bodies of water. In addition, the towns will insure that all developments are in accordance with the State of Maine Plumbing Code, which specifies the type, location, and conditions for installation of septic systems.

Explanation of Costs and Implementation: The costs for land treatment application would be borne by landowners and operators with cost sharing assistance available through existing conservation programs. Technical assistance required could be furnished by local, state, and federal agencies through the use of their going program funds, but with PL-566 funds available for necessary accelerations. The estimated cost of the land treatment phase is \$747,700.

Engineering services for flood plain management, to identify the 100-year flood plains of classified bodies of water in the watershed, is estimated to cost \$250,000. The Soil Conservation Service, through its PL-566 authorities, could delineate the flood hazard area and provide information concerning elevations and water flow capacities. The delineation of the flood plain areas by bench level circuits, and the development and publishing of ordinances is estimated to cost \$80,000 and would be borne by the towns in the watershed.

Effects and Impact: Land treatment measures will aid in enhancing the quality aspects of water and land by controlling pollution and erosion and by establishing and maintaining the vegetative cover of the watershed. Runoff, erosion, and sedimentation will be reduced. Runoff is expected to be reduced by about 2 percent. Erosion rates on untreated agricultural land will be reduced to three from nine tons per acre annually with the application of land treatment measures. Treatment on grassland will reduce erosion to one-quarter from one ton per acre, and to one-half from three tons per acre on forest land. Wildlife habitat management will be carried out on more than 500 acres.

The present annual estimated sediment yield at the mouth of the watershed is 29,000 tons. Land treatment measures should reduce this to 10,000 tons. Sediment concentration, as an annual average, will be reduced to less than 100 milligrams per liter.

The soil survey, production of flood plain delineation maps, establishment of land-use regulations, and a flood plain management program for the watershed will preserve the basic natural resources, areas of natural beauty, lakes and streams, and will preclude their misuse. While this limits the type of future use, it also limits the market value of the land. No estimate was made of the total amount of flood plain land in the watershed or its reduced market value. However, this flooded land will be preserved for agricultural, wildlife, and other appropriate uses. Since no structural measures are planned, lake level conditions

would remain unchanged, and the detrimental effect of the fluctuating water level on 25 acres of fish spawning area and 250 acres of waterfowl habitat would remain, as would flooding of the existing camps and cottages.

TABLE 1

ABBREVIATED ENVIRONMENTAL QUALITY PLAN

TWENTYFIVE MILE STREAM WATERSHED

Waldo, Kennebec, Penobscot, and Somerset Counties, Maine

1/
Estimated Cost

Cost Item	Total
<u>LAND TREATMENT PHASE</u> Treatment of Land Areas Technical Assistance	\$481,500 \$266,200
<u>NONSTRUCTURAL PHASE</u> Flood Plain Management Program Engineering and Technical Assistance	\$ 80,000 \$250,000
PROJECT ADMINISTRATION	\$ 25,000
TOTAL PROJECT	\$1,102,700

1/ Price base 1974

SECTION 3

DISPLAY OF FOUR ACCOUNTS

Selected Plan

Twentyfive Mile Stream Watershed Project, Maine
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

<u>Components</u>	<u>Measures 1/ of Effects</u>	<u>Components</u>	<u>Measures 1/ of Effects</u>
Beneficial Effects:		Adverse Effects:	
A. The value to users of increased outputs of goods and services		A. The value of resources required for a plan	
1. Flood prevention	\$77,950	1. Floodwater retarding structure and channel work	
2. Utilization of unemployed and underemployed labor resources	\$13,500		
		Project installation (structural measures)	\$55,840
		Project administration	\$3,860
		Operation & maintenance	\$1,100
		Total Adverse Effects	\$60,800
		Net Beneficial Effects	\$30,650
		Total Beneficial Effects	\$91,450
		1/ Average Annual	
		2/ 100 years @ 6 7/8 percent interest	

Selected Plan

Twentyfive Mile Stream Watershed Project, Maine

ENVIRONMENTAL QUALITY ACCOUNT

<u>Components</u>	<u>Measures of Effects</u>	<u>Components</u>	<u>Measures of Effects</u>
Beneficial and Adverse Effects:			
A. Areas of natural beauty.	1. Disrupt tranquility of rural environment through construction of the project, possible construction of new cottages, and increased access to and recreation use of the area. 2. Alter the appearance of a natural channel.		3. Provide additional soils and flood plain information to aid in land use planning. 4. Protect land resources by providing flood protection to 1,700 acres of land, as well as to 163 lake front cottages and homes, 1,700 feet of road, and one bridge.
B. Quality considerations of water, land, and air resources	1. Land treatment will improve hydrologic conditions, cover, and water quality by decreasing soil loss, erosion, and sedimentation by about two-thirds and reducing runoff by about two percent. 2. Reducing lake level fluctuation by 2.5 feet will reduce the amount of shoreline exposed to erosion during flooding and improve water quality by reducing the incidence and degree of well and spring contamination from flooded septic systems and introduction of nutrients into the lake.		5. Increase traffic density, road deterioration, and noise, air, and water pollution (turbidity from sediment) during construction, during new cottage development, and as a result of increased tourism and recreation. 6. Increase aquatic vegetation growth along the lake shore.
		C. Biological resources & selected ecosystems	1. Land treatment will improve wildlife management practices.

ENVIRONMENTAL QUALITY ACCOUNT (Cont'd.)

<u>Components</u>	<u>Measures of Effects</u>	<u>Components</u>	<u>Measures of Effects</u>
C. Biological resources & selected ecosystems	<p>2. Diversify, create, and/or mitigate for fish, waterfowl, and/or other wildlife habitat and increase carrying capacities by:</p> <p>a) diking cutoff meanders to retain a total of 10 acres of shallow ponded water, type 5 wetland;</p> <p>b) planting and maintaining open areas such as the channel travelway, banks, and spoil disposal areas with foodbearing or cover-providing shrubs, legumes, and grasses;</p> <p>c) reducing areas and frequency of flooding;</p> <p>d) lowering the water table about one foot in the vicinity of channel excavation;</p> <p>e) leaving a one-foot layer of broken rock over a 35,000 square yard area of the channel;</p> <p>f) excavating fish pools and creating riffles; and</p> <p>g) maintaining the south side of the channel in as near its natural state whenever possible, with large trees left for shade and spoil placed on the north side.</p> <p>3. Reduce the amount of lake level fluctuation by 2.5</p>	<p>feet, thereby:</p> <p>a) providing better nesting conditions for waterfowl;</p> <p>b) providing better conditions for shoreline and marsh-spawning fish;</p> <p>c) preventing exposure of eggs deposited during spring high water; and</p> <p>d) allowing better submerged aquatic plant growth along the lake shoreline.</p> <p>4. Reduce in area, change, and/or destroy existing types of fish, waterfowl, and/or other wildlife habitat by:</p> <p>a) selectively clearing and snagging 1,500 feet of existing channel;</p> <p>b) constructing 9,500 feet of a combination of new and enlarged channel;</p> <p>c) using 11.1 acres of type 7 wetland for channel and drop structure construction;</p> <p>d) shortening the channel by 3,200 feet;</p> <p>e) reducing areas and frequency of flooding;</p> <p>f) lowering the water table about one foot in the vicinity of channel work; and</p> <p>g) possible loss of 40 acres to cottage development.</p>	<p>-xi-</p>

ENVIRONMENTAL QUALITY ACCOUNT (Cont'd.)

<u>Components</u>	<u>Measures of Effects</u>
C. Biological resources & selected ecosystems	5. Loss of some fish and wildlife during construction.
D. Irreversible and irretrievable commitments	<ol style="list-style-type: none">1. Use 11.1 acres of type 7 wetland for construction.2. Possible loss of 40 acres of woodland and wildlife habitat to cottage development.3. Change cutoff meanders from free-flowing channels to 10 acres of fresh ponded water.4. Use about 30 acres for farm and wildlife ponds under the land treatment program.5. Preclude use of funds, energy, labor, and materials elsewhere.6. Loss of some fish and wildlife during construction.

Selected Plan

Twentyfive Mile Stream Watershed Project, Maine

REGIONAL DEVELOPMENT ACCOUNT

<u>Components</u>	<u>Measures of Effects</u>		
	<u>State of Maine</u>	<u>Rest of Nation</u>	<u>Rest of Nation</u>

Employment:

Beneficial Effects:

A. Increase in the number and types of jobs

1. Employment for project construction

13 semi-skilled jobs of 6 months each for 5 years

13 semi-skilled jobs of 6 months each for 5 years

2. Employment for project operation and maintenance

1/10 permanent semi-skilled job

1/10 permanent semi-skilled job

Adverse Effects:

A. Decrease in number and types of jobs

None

None

Selected Plan

Twentyfive Mile Stream Watershed Project, Maine
REGIONAL DEVELOPMENT ACCOUNT

Measures of Effects

<u>Components</u>	<u>State of Maine</u>	<u>Rest of Nation</u>
Population distribution:		
Beneficial effects	No effect on permanent population.	--
	May increase seasonal population.	--
Adverse effects	--	--
Regional Economic Base and Stability:		
Beneficial effects	Strengthen the area's agriculture and recreation industries.	--

Selected Plan

Twentyfive Mile Stream Watershed Project, Maine
SOCIAL WELL-BEING ACCOUNT

Components

Measures of Effects

Beneficial and adverse effects:

A. Real income distribution

1. Create 13 low to medium income nonpermanent jobs for area residents.
2. Create annual regional income benefit distribution of \$97,500 by income class as follows:

Income Class (Dollars)	Percentage of Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	20	10
3,000 - 10,000	57	60
More than 10,000	23	30

3. Local costs to be borne by region total \$60,800 with distribution by income class as follows:

Income Class (Dollars)	Percentage of Adjusted Gross Income in Class	Percentage Contributors in Class
Less than 3,000	20	10
3,000 - 10,000	57	60
More than 10,000	23	30

B. Life, health and safety

1. Provide 100 year level of protection to 157 cottages and properties.
2. Increased safety with decreased flooding of roads.
3. Improvement in health with decreased flooding of septic systems and contamination of springs and wells.
4. Increase quantity and quality of agricultural products, thereby increasing income and quality of life of residents.

C. Recreational opportunities

1. Increase recreational access to Twentyfive Mile Stream. Increases average number of useable days on Lake Winnecook.

WATERSHED WORK PLAN
TWENTYFIVE MILE STREAM WATERSHED
MAINE

Prepared under the Authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress, 68 Stat. 666), as amended.

Prepared by:

Waldo County Soil and Water Conservation District

Town of Unity

Town of Troy

Town of Burnham

With assistance by:

U. S. Department of Agriculture, Soil Conservation Service

U. S. Department of Agriculture, Forest Service

DECEMBER 1975

WATERSHED WORK PLAN AGREEMENT

between

Town of Unity

Town of Troy

Town of Burnham

Waldo County Soil and Water Conservation District

(hereinafter referred to as the Sponsoring Local Organization)

State of Maine

and the

Soil Conservation Service

United States Department of Agriculture

(hereinafter referred to as the Service)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsoring Local Organization for assistance in preparing a plan for works of improvement for the Twentyfive Mile Stream Watershed, State of Maine, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress; 68 Stat. 666), as amended; and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Service; and

Whereas, there has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service a mutually satisfactory plan for works of improvement for the Twentyfive Mile Stream Watershed, State of Maine, hereinafter referred to as the watershed work plan, which plan is annexed to and made a part of this agreement;

Now therefore, in view of the foregoing considerations, the Sponsoring Local Organization and the Secretary of Agriculture, through the Service, hereby agree on the watershed work plan, and further agree that the works of improvement as set forth in said plan can be installed in about five years.

It is mutually agreed that in installing and operating and maintaining the works of improvement substantially in accordance with the terms, conditions, and stipulations provided for in the watershed work plan:

1. The Sponsoring Local Organization will acquire, with other than PL-566 funds, such landrights as will be needed in connection with the works of improvement. (Estimated cost \$5,000).
2. The Sponsoring Local Organization assures that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsoring Local Organization and the Service as follows:

<u>Sponsoring Local Organization</u>	<u>Service</u>	<u>Estimated Relocation Payment Costs</u>
<u>Relocation payments</u>	30.6	69.4

1/ Investigation has disclosed that under present conditions the project measures will not result in the displacement of any person, business, or farm operation. However, if relocations become necessary, relocation payments will be cost-shared in accordance with the percentages shown.

3. The Sponsoring Local Organization will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.
4. The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organizations and by the Service as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
Site #1 - Box Inlet Drop Structure, Bridge Deck and Road Approaches	27.5	72.5	131,000 2/
Channel Enlargement, Type C Drop Structure, and Clearing and Snagging	0	100	640,000

2/ This includes sponsor's nonproject cost for a bridge deck over the box inlet structure and the road approaches. This does not include the relocation or realignment of the road being contemplated by the sponsors which would also be a nonproject cost.

5. The percentages of the engineering costs to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Engineering Cost</u> (dollars)
Site #1 - Box Inlet Drop Structure	0	100	15,000
Bridge Deck and Road Approaches	100	0	10,000
Channel Enlargement, Type C Drop Structure, and Clearing and Snagging	0	100	56,000

6. The Sponsoring Local Organization and the Service will each bear the costs of Project Administration which it incurs, estimated to be \$6,000 and \$50,000 respectively.

7. The Sponsoring Local Organization will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.

8. The Sponsoring Local Organization will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed work plan.

9. The Sponsoring Local Organization will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.

10. The Sponsoring Local Organization will be responsible for the operation and maintenance of the structural works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.

11. The Sponsoring Local Organization will be responsible for the land adjacent to Lake Winnebago to prevent any future permanent development from occurring below elevation 180 feet mean sea level.
12. The costs shown in this agreement represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.
13. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by the Service in carrying out the watershed work plan is contingent on the availability of appropriations for this purpose. A separate agreement will be entered into between the Service and the Sponsoring Local Organization before either party initiates work involving funds of the other party. Such agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
14. The watershed work plan may be amended or revised, and this agreement may be modified or terminated only by mutual agreement of the parties hereto except for cause. The Service may terminate financial and other assistance in whole, or in part, at any time whenever it is determined that the Sponsoring Local Organization has failed to comply with the conditions of this agreement. The Service shall promptly notify the Sponsoring Local Organization in writing of this determination and the reasons for the termination, together with the effective date. Payments made to the Sponsoring Local Organization or recoveries by the Service under projects terminated for cause shall be in accord with the legal rights and liabilities of the parties.
15. No member of or delegate to congress or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
16. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7 C.F.R. 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activity receiving federal financial assistance.
17. This agreement will not become effective until the Service has issued a notification of approval and authorizes assistance.

Town of Unity
Local Organization

By
Title
Date

The signing of this agreement was authorized by a resolution of the governing body of the Town of Unity adopted at a meeting held
Local Organization
on _____.

Secretary, Local Organization

Address

Zip Code

Date

* * * * *

Town of Burnham
Local Organization

By
Title

Address

Zip Code

Date

The signing of this agreement was authorized by a resolution of the governing body of the Town of Burnham
Local Organization
adopted at a meeting held on _____.

Secretary, Local Organization

Address

Zip Code

Date

* * * * *

Town of Troy
Local Organization

By
Title

Address

Zip Code

Date

The signing of this agreement was authorized by a resolution of the governing body of the Town of Troy adopted at a
Local Organization
meeting held on _____.

Secretary, Local Organization

Address

Zip Code

Date

Waldo County Soil and Water
Conservation District
Local Organization

By _____

Title _____

Date _____

Address _____

Zip Code _____

The signing of this agreement was authorized by a resolution of the
governing body of the Waldo County Soil and Water Conservation District
Local Organization
adopted at a meeting held on _____.

Secretary, Local Organization

Address _____

Zip Code _____

Date _____

Appropriate and careful consideration has been given to the environmental
impact statement prepared for this project and to the environmental aspects
thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

State Conservationist

WORK PLAN

for

TWENTYFIVE MILE STREAM WATERSHED

Waldo, Kennebec, Penobscot, and Somerset Counties, Maine

WATERSHED PROTECTION AND FLOOD PREVENTION

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WATERSHED WORK PLAN

TWENTYFIVE MILE STREAM WATERSHED

Waldo, Kennebec, Penobscot, and Somerset Counties

Maine

December 1975

SUMMARY OF PLAN

The Twentyfive Mile Stream Watershed Work Plan for watershed protection and flood prevention was prepared by the Waldo County Soil and Water Conservation District and the towns of Unity, Burnham, and Troy, the sponsors of the project. Technical assistance was provided by the Soil Conservation Service and the Forest Service of the United States Department of Agriculture.

The Twentyfive Mile Stream Watershed, an area of 144.7 square miles (92,637 acres), is located in northern Waldo County with small portions in Kennebec, Penobscot, and Somerset Counties. The watershed consists of two principal tributaries: Carlton Stream drains the northern portion of the watershed and flows in a southerly direction into Lake Winnecook; Sandy Stream, the major tributary, drains the southern portion of the watershed and flows in a northerly direction into Lake Winnecook near the outlet. Twentyfive Mile Stream originates at the outlet of Lake Winnecook and flows in a northwesterly direction to its confluence with the Sebasticook River at Burnham Village.

The major problem in the watershed is floodwater damage to agricultural land, roads, bridges, recreational facilities, and residential and vacation homes.

The purpose of the proposed project is to develop the water and related land resources of Twentyfive Mile Stream Watershed for their most efficient use by providing watershed protection through flood prevention and land treatment. The proposed project will provide an estimated 95 percent reduction in floodwater damages. This will be accomplished by obtaining 5 to 100-year protection with channel improvement and by lowering the 100-year flood level on the lake by 2.5 feet. This work plan provides for accelerating the soil survey and the installation of land treatment and structural measures. These measures include the construction of a box inlet drop structure, a Type C drop structure, about 9,500 feet of channel realignment and enlargement, and about 1,500 feet of intermittent clearing and snagging. All measures are scheduled for installation within a 5-year installation period.

The soil survey and flood plain delineation map will provide the sponsors with additional information necessary to regulate land use in the watershed.

The towns are responsible for the approval of all new development adjacent to classified bodies of water, in accordance with the mandatory Shoreland

Zoning Law as adopted by the State of Maine Legislature. In addition, the towns will insure that all developments are in accordance with the State of Maine Plumbing Code which governs private sewage disposal.

The installation of the planned structural and nonstructural measures will provide the following major effects: flood protection to 163 lake-front cottages and property, and to roads, bridges, and agricultural land; conservation treatment on 27,324 acres of land; stabilization of the water level on Lake Winnecook; increased employment opportunities during construction; clearing and snagging of 1,500 feet of channel and 9,500 feet of realignment and enlargement along Twentyfive Mile Stream; reduced flood frequency and lowered ground water table on about 800 acres of wetland; and related changes in fish and wildlife habitat in and along Lake Winnecook and Twentyfive Mile Stream.

The town of Unity will perform all operations and maintenance on the proposed works of improvement. All structural works of improvement will be inspected at least annually, and after every major storm or after the occurrence of any unusual adverse conditions that affect their operation. Land treatment measures will be maintained by landowners and operators of watershed land where such measures are installed.

The installation cost of land treatment measures is estimated to be \$747,700 of which \$281,800 is for technical assistance. Public Law 566 funds will bear \$266,200 of the technical assistance cost and \$15,600 will be borne by other funds. Land treatment practices borne by other than PL-566 funds are estimated to be \$465,900.

The estimated installation cost of the structural measures is \$867,000. Public Law 566 funds will bear \$856,000 of this amount. Local funds will bear the remaining cost of \$11,000 for land rights and project administration. The total estimated installation cost of both the land treatment and structural measures is \$1,614,700.

The local sponsors will provide land rights and pay the project administration costs they incur. The land rights cost, project administration cost, and the annual operation and maintenance costs are estimated to be \$5,000, \$6,000, and \$1,100 respectively. The sponsors will provide the nonproject cost associated with Site No. 1, estimated to be \$46,000. The Sponsors will bear costs that they incur by means of local tax revenues.

The average annual cost of the structural works of improvement included in the project is estimated to be \$60,800. The average annual benefits resulting from these works of improvement are estimated to be \$97,500. These benefits include secondary benefits of \$6,050, redevelopment benefits of \$13,500, urban changed land use of \$8,100, and damage reduction benefits of \$69,850. The project has a benefit-cost ratio of 1.6:1.0.

WATERSHED RESOURCES - ENVIRONMENTAL SETTING

Physical Data

The Twentyfive Mile Stream Watershed, primarily located in the northwestern part of Waldo County, Maine, has a drainage area of 92,637 acres (144.7 square miles) and is a portion of the Kennebec River Basin. The watershed encompasses portions of Kennebec, Somerset, and Penobscot Counties and includes parts of the townships of Burnham, Detroit, Freedom, Knox, Montville, Plymouth, Thorndike, Troy, Unity, and Unity Plantation. The watershed is located in the central part of the state about 35 miles northeast of Augusta, 33 miles southwest of Bangor, and 200 miles northeast of Boston.

The watershed is within the St. Croix Water Resource Planning Area, as identified by the Water Resources Council.

Soil and water resource problems occur around the periphery of Lake Winnecook when flooding inundates seasonal cottages and permanent homes. Flooding problems also occur downstream from the lake, and include 180 acres of agricultural land, one and one-half miles of road, and three bridges. The present 100-year flood plain identified in the project area covers about 1,700 acres.

The Twentyfive Mile Stream Watershed lies within the coastal lowlands section of the New England Physiographic Province of the Appalachian Highlands. This region has been affected by at least the last major advance of continental glaciation. The soils are derived from glacial drift (till and outwash) which was deposited during the last glacial age. Following the retreat of continental glaciation which completely covered this region, the lowlands were subject to marine submergence up to at least the present elevation of 300 feet, and then the present land mass was uplifted above sea level. As a result, the surficial geology is a combination of glacial processes, marine sedimentation, and post uplift erosion. Deposits from the glacial processes are complexly interfingered with marine and estuarine deposits.

The watershed can be divided into two relatively different topographic areas. The area east and southeast of Lake Winnecook is typified by rolling hills up to an elevation of 960 feet. The area west of Lake Winnecook is a low flatland area with a maximum elevation of 300 feet.

The soil types distributed through the two topographic areas vary as a result of different parent materials and environment of formation. The eastern and southeastern areas are dominated by glacial till; however, there are other parent materials such as glacial outwash and recent stream deposits. The following soils found in the area are derived from glacial till parent material but vary from each other in thickness and drainage: Thorndike, shallow, excessively well-drained, located on slopes and tops of rolling hills; Dixmont and Sutton, deep, moderately well-drained, located on gentle-to-rolling slopes; Monarda and Leicester,

deep, poorly drained, located in depressions and near streams. Other soils in this area, but of limited extent, are Windsor, Deerfield, Hartland, and Belgrade, located on glacial outwash deposits, and Limerick, located on recent alluvium.

The geologic history of the area to the west of Lake Winnecook differs from the eastern area. The post-glacial marine inundation of the western area left widespread fine-grained deposits at the lower elevations. The hills, however, are mantled with glacial till similar to that which exists in the eastern area. The Dixmont and Monarda soils have developed on these till areas and their characteristics are as previously described. The fine grained marine deposits located in the flat lowlands are the parent material for Scantic soils which are deep and poorly drained. Modern alluvial processes have produced more widespread deposition of alluvium in the western area than in the eastern area. These deposits form the parent material for Limerick soils which are deep, poorly drained, and located in the lowlands adjacent to major drainageways.

The Thorndike, Dixmont, Limerick, and Scantic soils occupy about 70 percent of the surface area of the watershed. The Sutton and Deerfield soils occupy 16 percent, and Monarda soils occupy the remaining 10 percent. Four percent of the surface area is water. The bedrock geology consists of one major undifferentiated, unnamed rock unit. It is composed of altered (metasedimentary) calcareous rocks. These rocks are slate and quartzite which have been intensely deformed and folded.

A summary of earthquake data in "Earthquake Hazard in Eastern United States," by B. F. Howell indicates that earthquakes have not been frequent or intense in the northeastern United States. Twentyfive Mile Stream is within Howell's "Region of Transient Hazard". The Appalachian Physiographic Region has an Average Cumulative Seismic Hazard Index of 7.34. A low hazard index is considered less than 5.4, the threshold of damage. More than 7.55 is considered high, the level where appreciable damage to normal construction is common. According to Fox in "Seismic Geology of the Eastern U. S.", this area falls into a Class "C" region, a region of relatively numerous epicenters, some damaging shocks, major structural features and/or proximity to areas which have devastating shocks. No major shocks have been reported in Maine over the last 70 years.

The large quantities of sand and gravel are the only geologic deposits of major economic importance. There are no known mineral deposits of commercial interest. The large quantities of water retained within the glacial outwash deposits offer excellent sources of water for domestic and commercial purposes.

The watershed has a modified continental-type climate with long, cold winters and mild summers. The normal growing season is 135 days extending from May 15 to September 27. The average yearly precipitation is 40.0 inches which is distributed fairly uniformly throughout the year. Snowfall averages 78 inches annually. The average monthly temperature ranges from 20 degrees in January to 68.5 degrees in July.

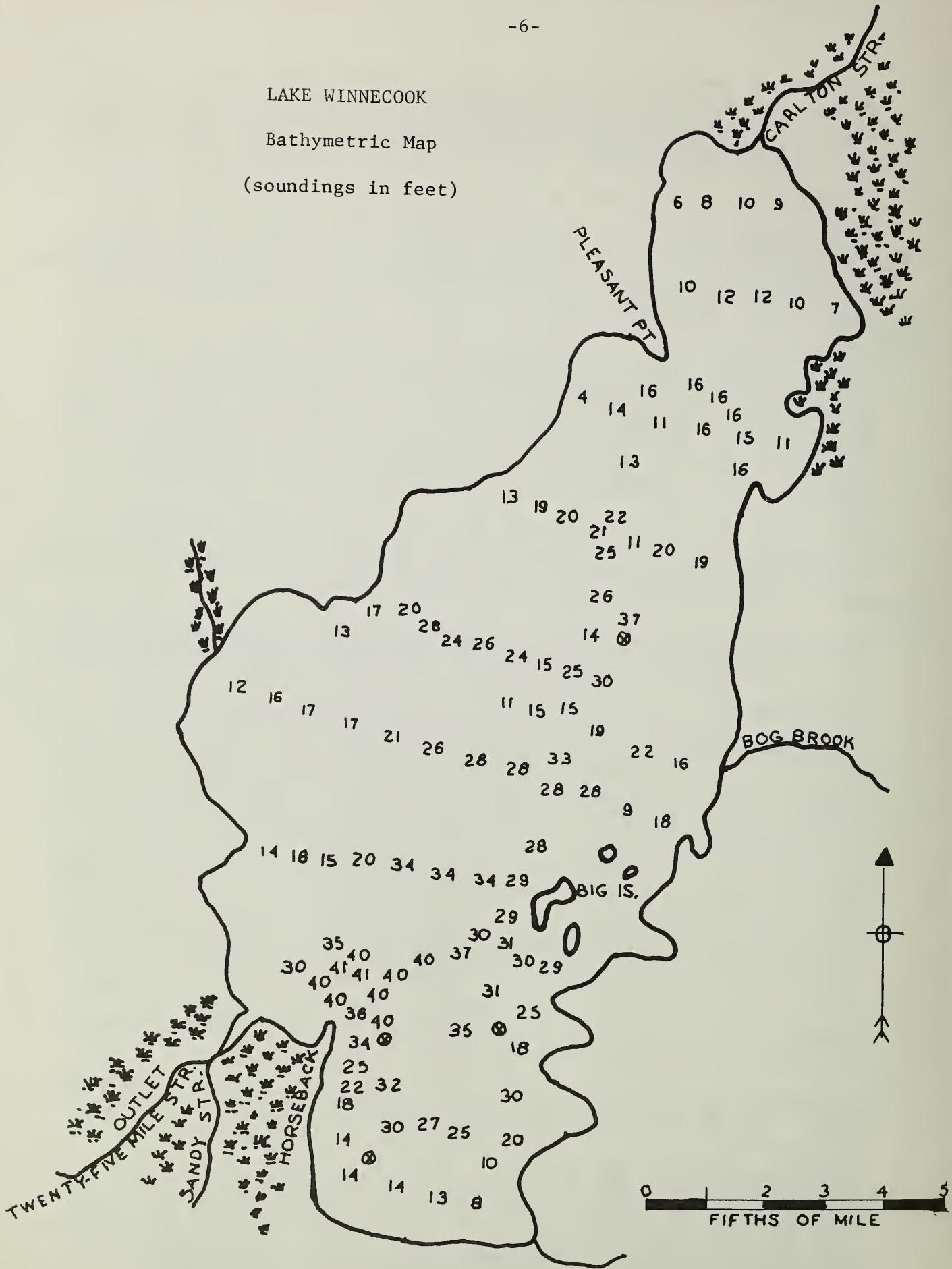
The present land use and cover is mostly forest which makes up about 79 percent (73,344 acres) of the watershed area. It has been determined that approximately 30 percent of the forest land is in a below average condition to retain runoff. The condition is expected to improve with the current level of fire protection and more intensified woodland management. The remainder of the watershed area consists of about 17 percent (15,415 acres) crop and grass land, and four percent (3,878 acres) lakes, ponds, and streams. Cover conditions for these lands range from fair to good. Land use in the soil and water resource problem areas falls into three categories: recreational and permanent homes, agriculture, and forest land.

Present forest stands, occupying 79 percent of the watershed area, consist of 46 percent northern hardwood type (beech-birch-maple); 36 percent softwood type (spruce-fir); and 18 percent mixed type (spruce-fir-northern hardwoods). About 54 percent of the forest stands are pole size, 5 percent are saw timber size having more than 1,500 board feet per acre, and 41 percent are in stands consisting of seedlings and saplings. Along Twentyfive Mile Stream below Prairie Road the vegetative cover is primarily elm, red and silver maple, ash, and alder. Undercover is composed of rather dense stands of red osier, silky cornel dogwood, viburnums, brambles, and weedy growths such as aster, goldenrod, beggar tick, hellebore, and various native grasses.

The watershed is comprised of a number of streams and brooks which flow into Lake Winnecook. Carlton Stream originates in the northern portion of the watershed at Carlton Pond and flows in a southerly direction into Lake Winnecook. Sandy Stream, the major tributary, starts in the southern portion of the watershed at Sandy Pond and flows in a northerly direction through the towns of Freedom and Unity and finally into Lake Winnecook. Twentyfive Mile Stream, originating at the outlet of Lake Winnecook, flows in a northwesterly direction for about five miles and joins the Sebasticook River at Burnham Village. The outlet and the major inlet of Lake Winnecook are near the same location. Stream gradients are low to moderate in the northern and western portions and are moderately steep in the southern and eastern portions of the watershed. Except for a short section of Sandy Stream, all streams are perennial and have well-defined natural channels. Sandy Stream, from Route 202 for several hundred feet downstream, was modified in the 1800's. No records were found to describe the kind and extent of changes that were made. The average sustained low flow that can be expected from Twentyfive Mile Stream is 23 cfs for a 30-day period, 32 cfs for a 60-day period, and 39 cfs for a 90-day period.

Lake Winnecook (2,230 acres) is the largest body of water in the watershed. (See Bathymetric map of Lake Winnecook). The lake depth and temperatures classify it, according to Maine Department of Inland Fisheries and Game Standards, as a warm water lake. This means that it is not conducive to the propagation of a salmon or trout fishery. The maximum depth of the lake is 41 feet. The summer temperatures range from 78° F. at the surface to 60° F. at 37 feet. The lake shoreline is about 11.6 miles long. Other ponds include Carlton Pond (430 acres), Sandy Pond (430 acres), and several smaller ponds and flowages.

LAKE WINNECOOK
Bathymetric Map
(soundings in feet)



The quality of fresh water in the watershed has been classified according to standards established by the Maine State Legislature. The classifications were defined by the Maine Department of Environmental Protection after a state-wide sampling program was completed. The classification of a particular body of water indicates the minimum quality level that is acceptable. The following table presents the quality standards for several levels of classification:

STATE OF MAINE

WATER CLASSIFICATION STANDARDS

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Classification	B-1	B-2	C
Dissolved oxygen 1/ , 2/	75%/ \geq 5ppm	60%/ \geq 5ppm	\geq 5ppm
Total coliform bacteria 3/	\leq 300	\leq 1000	\leq 5000
Fecal coliform bacteria 3/	\leq 60	\leq 200	\leq 1000
pH	6.0 - 8.5	6.0 - 8.5	6.0 - 8.5

1/ percent saturation

2/ parts per million

3/ number per 100 ml.

Class "B-1" water shall be the highest quality of the Class B group and shall be acceptable for recreational purposes, including bathing, for use as a potable water supply after treatment, and for fish and wildlife habitat.

Class "B-2" water shall be acceptable for recreational purposes including bathing, for industrial and potable water supply after adequate treatment, and for fish and wildlife habitat.

Class "C" water shall be of a quality as to be satisfactory for recreational boating and fishing, for fish and wildlife habitat, and for other uses except potable water supplies and swimming, unless such waters are adequately treated.

The following fresh waters in the watershed are classified as Class "C": Carlton Stream and tributaries, and Sandy Stream, main stem, from the outlet of Sandy Pond to its junction with Halfmoon Stream, and from its junction with Bacon Brook to a point one-half mile above the entrance of Mussey Brook. Lake Winnecook is classified as Class "B-1". All other tributaries and streams in the watershed are classified as Class "B-2".

The Maine Department of Inland Fisheries and Game has completed a wetlands inventory in this area. The following table outlines the results of the study which identifies the wetlands of the watershed in accordance with Circular-39, "Wetlands of the U. S.", U. S. Department of the Interior.

Type:	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Comb. <u>4 & 6</u>
Acres:	297	67	1053	2787	153	300	230

The following areas are significant in acreage: Twentyfive Mile Stream downstream from Route 139, Type-6, 140 acres; Twentyfive Mile Stream downstream from Prairie Road, Type-7, 300 acres; Bithers Brook, Type-2, 152 acres; Carlton Stream, Type-2, 108 acres; Carlton Pond, Type-4, 860 acres; Twentyfive Mile Stream between Prairie Road and the railroad tracks, Type-4 and Type-6, 230 acres; and the northern end of Lake Winnecook, Type-5, 120 acres.

Present and Projected Population

Unity, the largest town in the watershed, was incorporated in 1804, and was first settled as "Twentyfive Mile Pond Plantation". The population was 1,557 in 1850, but declined to 877 in 1900. Since 1900, the town has shown a slow, steady growth to its present population of about 1,200. There are approximately 3,800 people living in the watershed. The 1972 OBERS projections for the Bangor economic area predict approximately a nine percent population increase for each ten-year period through 2020.

Economic Data

The watershed is within OBERS Bangor Economic Area. Per-capita income relative to the national average was 0.76 in 1970. The watershed is characterized as a low-income area.

Land ownership in the watershed is privately held except for about 2,885 acres of public land. The town of Troy controls about 1,350 acres of forest land. The State of Maine administers approximately 1,500 acres in the vicinity of Frye Mountain as a game management area located on the southern watershed divide and a five-acre boat access site on Sandy Stream. Unity has 30 acres in public ownership.

The balance of the forest land is held by an estimated 175 private owners. Carlton Pond and adjacent areas, involving about 1,800 acres, are managed by the U. S. Fish and Wildlife Service as a waterfowl production area. All major roads are publicly owned.

The watershed is accessible by federal, state, and town highways. U. S. Route 202 passes through the town of Unity and the central portion of the watershed. A number of state highways run through the watershed. A network of rural roads serves as farms and woodlots in the watershed. There are no commercial air transportation facilities in the watershed; however, Augusta, about 35 miles to the southwest, and Bangor, about 33 miles to the northeast, offer these facilities. Railroad freight service is provided by the Belfast and Moosehead Lake Railroad.

Unity Institute was established in 1966 with 38 students; it is now Unity College and has a four-year program and degree granting privileges which began with the Class of 1970. The present enrollment of Unity College is 300 students.

The economy of the watershed is based primarily on agriculture, forestry, and associated industries. Agricultural and wood product processors and manufacturers are the basic industries in the town of Unity. According to the 1968 Census of Maine Manufacturers, the value of production for Unity industries was \$1,171,934; gross wages paid were \$377,663. The average gross wage was \$3,174 per worker.

Employment in agriculture and forestry during the past 20 years has decreased by more than one-half in the Bangor Economic Area. The trend is expected to continue at a lesser rate in the future.

There are about 420 farms scattered throughout the watershed of which approximately 145 are full-time farms. The average-sized farm is approximately 200 acres. According to the 1969 Census of Agriculture, the average value of land and buildings per farm was \$39,000 in Waldo County. The average value per acre of cropland is about \$225 and the average value per acre of woodland is about \$75. The average gross sale of farm products for farms with over \$2,500 in sales is \$38,000. The number of farming units has been decreasing and the size of farms has been increasing in the watershed area. The number of farms in Waldo County has decreased from 942 in 1964 to 517 in 1969. Cropland acreage in Waldo County has decreased from 43,000 acres to 31,000 acres. Some financially marginal dairy enterprises are converting to poultry.

Over 95 percent of the farms in the watershed are family farms. Farm units in the low-income category (gross sales of less than \$20,000) comprise about 35 percent of the farms. Twenty-five percent of the farm units are below the poverty level net income of \$4,000.

Local markets are good for cedar, hardwood and softwood pulp, saw-logs, Christmas trees and greens, boltwood (birch and maple), and maple syrup products. Gray birch is utilized in a speciality market. The market for aspen is poor.

The average value of cottages on Lake Winnecook is estimated to be \$6,000. Shorefront lots average \$60 per front foot. Urban land in Unity averages \$2,000 per acre.

Under the Public Works and Economic Development Act of 1965, this watershed is within the area designated as the "New England Economic Development Region".

Fish and Wildlife Resources

Warm and cold water fisheries exist in the watershed. Lake Winnecook provides a warm water habitat. Smallmouth bass, largemouth bass, chain pickerel and white perch provide the largest populations of game fish species in the lake. The lake also supports an abundant population of American smelt. Spawning areas for the game fish species occur along the shoreline.

Halfmoon Stream is an excellent natural brook trout stream. Sandy Stream is also a good brook trout stream from the point of its confluence with Halfmoon Stream downstream to Lake Winnebago. Both Halfmoon Stream and Sandy Stream are stocked irregularly with brook trout to augment the existing natural populations of these fish.

A fisheries survey was made on Twentyfive Mile Stream by the Maine Department of Inland Fisheries and Game in July 1964. The fish population was a mixture of cold and warm water types. In order of relative abundance, the species are:

Golden Shiner
Fall Fish
Bullhead
Chain Pickerel
White Sucker
Yellow Perch
Smallmouth Bass
Brook Trout

The only fish stocked are brook trout. This stocking is not part of a regular stocking program, but rather is done intermittently as fish are available. The stream supports a fair early season brook trout fishery--summer flows and temperature are the limiting factors.

The Twentyfive Mile Stream habitat is primarily suited for warm water fish. The bottom consists of a mixture of rubble, sand, and several large boulders. The pool to riffle ratio is 1:1. Cover is excellent for two miles below Prairie Road and good to excellent from that point to the Sebasticook River. Water quality in July 1964 was recorded as follows: Temperature = 70° F., Dissolved oxygen = 8 parts per million, pH = 6.7 to 7.0. The stream contains good to excellent spawning conditions for smallmouth bass and pickerel from Prairie Road to the Sebasticook River.

The large Type-4 wetland area, between Prairie Road and the railroad bed, is vegetated primarily by bulrush-bluejoint and is ideal duck habitat. There is some cattail marsh suitable for ringnecked ducks. Much of the area is in shrubby cover such as sweetgale (*Myrica gale*), button-bush, leather leaf, and other typical northern swamp species. Woodlands occupy the slightly higher elevations and the species are elm, black and brown ash, and silver and red maple. Trees on the thin margins between swamp and upland benefit both waterfowl and game. There is fair-to-excellent woodcock cover, depending upon the stage of succession on the old hayfields, adjacent to the present stream. Woodcock, ruffed grouse, white-tailed deer, snowshoe hare, fox, raccoon, otter, and skunk are the chief wildlife species inhabiting the watershed area. The Sebasticook River provides habitat for waterfowl, particularly black duck, wood duck, teal, and goldeneye.

No known rare or endangered wildlife species utilize the watershed.

Recreational Resources

There is one commercial marina and campground on Lake Winnecook. According to the Maine Comprehensive Outdoor Recreation Plan, there is a current need of day-use facilities to accommodate 750 persons, and this will rise to 1,200 persons in 1990. These figures are for the Pittsfield Day-Use Area which includes the whole Twentyfive Mile Stream Watershed. Day-Use facilities in the watershed today are less than current needs. The current facilities can accommodate about 50 persons. A public boat launch facility and a picnic area have been recently constructed on Sandy Stream.

Hunting opportunities are excellent for woodcock, ruffed grouse, white-tailed deer, snowshoe hare, fox, raccoon, and ducks. Hunting pressure for these species is light to moderate. There is moderate fishing pressure for warm water species by both residents and non-residents. Fishing for cold water species is located primarily in Sandy and Halfmoon Streams and their upstream tributaries.

Twentyfive Mile Stream is popular with a small number of canoeists. The classification of surface waters by the Maine Department of Environmental Protection indicates that even those waters in the watershed carrying the lowest classification, "C", are satisfactory for recreational boating and fishing, fish and wildlife habitat, and other uses except potable water supplies and water contact recreation.

Public access to Lake Winnecook is provided by the boat launch on Sandy Stream. Public access is also permitted to the state and federal game management areas in the watershed.

Archeological, Historical, and Unique Scenic Resources

Dr. David Sanger, Associate Professor of the Department of Anthropology of the University of Maine at Orono and a member of the Maine Historic Preservation Commission, made a study of the construction area to determine the possible presence of any archaeological resources. A field survey was made from the outlet of Lake Winnecook to a point two miles downstream on Twentyfive Mile Stream. The study includes a review of existing records and interviews with local "relic collectors." No archaeological values were discovered.

As of June 3, 1975, there were no known properties within the watershed listed in, or eligible for the National Register of Historic Places. The "Maine Historic Resources Inventory," published by the Maine Historic Preservation Commission in August 1974, lists the following historic building within the watershed:

"QUAKER MEETING HOUSE - Unity, Maine, (1827), Private

A serenely plain wooden meeting house which reflects in this architecture the beliefs of the Quakers who constructed it."

The meeting house will not be affected by the proposed project.

The area is not uniquely scenic.

Any values found in the future will be handled as stated in Public Law 86-523, National Reservoir Salvage Act; and Public Law 89-665, National Historic Preservation Act.

Soil, Water, and Plant Management Status

The overall trend in changed land use is nearly static. There has been a decrease in total cropland acreage from 43,000 to 31,000 acres from 1964 to 1969 in Waldo County.

The Waldo County Soil and Water Conservation District was organized in 1944. There are 469,760 acres in the district, with less than 10 percent in crops and pasture. The farming trend within the district has changed from general to intensive poultry and milk production. This trend has brought about a change from cropland to grassland. There are 163 District Cooperators in the watershed, and 115 conservation plans have been completed. About 57 percent of the land in the watershed is under cooperative agreement, and about 30 percent of planned conservation practices are applied. There are 74 Federal-State Forest Management Cooperators.

Modern resource conservation calls for the overall planning and treatment of units of land and water larger than the individual landholding. With this in mind, the modernized program of the district reflects the need for developing a broad approach to soil and water resource planning to augment the changing pattern of land use and ownership. Soil and water conservation on urban, wildlife, industrial, and recreational land is becoming increasingly critical. The district has placed a high priority on soil surveys to provide a sound basis for assistance to landowners, towns, and others in resource planning. The district also places a high priority on providing assistance to low-income farmers and to recreational development.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land Treatment

A survey of land treatment problems in the watershed indicates that a total of 27,324 acres are in need of land treatment measures. Erosion, sedimentation, water management, low fertility, low crop yields, and animal and septic waste disposal are the major soil-related problems. Good cropland is at a premium and forms the basis of individual farming operations. Erosion on cropland averages 9 tons per acre per year over the life of the typical crop rotation. There is a direct correlation between the conditions of the cropland and the economic condition of the individual farm. Most farms are operated under a low level of management with inadequate land treatment. As a result, crop production is low. Land treatment, consisting of a good conservation crop system and a water management system, are necessary not only to perpetuate the agricultural productivity of the land, but to ensure the financial success of the individual family farm.

Sediment is a problem to communities in the watershed. Sediment is not a major threat to streams or reservoirs, but road ditches adjacent to cropland must be cleaned out frequently to maintain drainage capacity. This problem is reflected in flooded and icy roads and in increased taxes to support required public services.

A potential land use problem is the disposal of animal waste. There are approximately 73 poultry farms and 49 dairy farms in the watershed which produce approximately 94,100 tons of waste annually.

Currently, poultry waste is disposed of by piling on the land. Most poultry enterprises are located on just a few acres of land, contain very little cropland and are highly specialized. The soils on the small amount of cropland are usually inadequate for high annual rates of waste application, and a high percentage of the soils are poorly drained or shallow to bedrock. The dairy farms, for the most part, recycle their waste through crop production; however, many farmers still apply their waste to snow-covered ground and to areas adjacent to streams, and could create a water pollution problem.

The land treatment practices on the Twentyfive Mile Stream Watershed are designed to bring about desired changes in land use and productivity, and to perpetuate the agricultural base. A high percentage of the farm operations in the watershed fall into the low-income-producing category, and a large number fall into the poverty category. The average size of operating units and the current indebtedness of the operators create a major problem for farmers to carry out and install needed land use adjustments and treatments.

About 17,200 acres of forest land are in need of land treatment measures. Approximately 30 percent of the forest land is in below-average hydrologic condition due to former land use. More than three miles of

eroding skid trails and logging roads contribute high rates of sedimentation and runoff. Low forest land productivity is partially due to improper management.

Floodwater Damage

Twentyfive Mile Stream has experienced several damaging floods in recent years. Major floods occurred in 1954, 1966, 1969 and 1973. Nearly every spring some damage is caused by a combination of snowmelt and rainfall. Long duration storms during late summer or fall may also cause flooding damages. The intense rainfall of September 11, 1954, estimated at a 5-year frequency, caused floodwater damaged estimated to be \$66,500.

Three reaches were developed for evaluation, T-1, the area around the shores of Lake Winnecock and Prairie Road; T-2, the area from Prairie Road to the ledge restriction in the channel; and T-3, the area below the ledge restriction.

The principal floodwater damages in reach T-1 include damages to camps and cottages, recreational property, 69 acres of agricultural land, and road and bridge damage to Prairie Road; in reach T-2, 84 acres of agricultural land; and in reach T-3, 27 acres of agricultural land plus road and bridge damage to Route 139.

Cottages around Lake Winnecock are subject to flooding from storms of approximately a 5-year frequency and above. Other types of property damage that occur on almost an annual basis include shore frontage, boat docks, boats, lawns, motors, and pumps. Average annual damage to property and cottages has been estimated at \$50,950. Approximately 280 cottage owners on Lake Winnecock are affected directly by flooding which includes 157 with first floor damage and/or property damage and the remaining 123 are indirectly affected by such problems as loss of access or increased travel distances.

The 100-year storm inundates approximately 180 acres of agricultural land; average annual damages are estimated to be \$500. Damage to roads and bridges begins with a 2-year frequency storm and average annual damages are estimated to be \$12,100. Indirect damages attributed to the flooding are estimated to be \$10,100, and include loss of wages, traffic rerouting, loss of power, and loss of income by businesses and inhabitants of the watershed. The frequent flooding of roads creates a hazardous condition during summer and winter to residents and travelers in addition to the inconveniences of indirect travel required by flooded roads. Frequent flooding of wells and septic disposal systems creates a health hazard.

Erosion and Sediment Damage

Agricultural lands adjacent to the outlet of Lake Winnecock are frequently flooded and suffer scour and infertile overwash damage; however, these damages are generally limited to a small amount of land adjacent



Flooding on Route 139. The intersection to Prairie Road is opposite to the truck. April 1969.



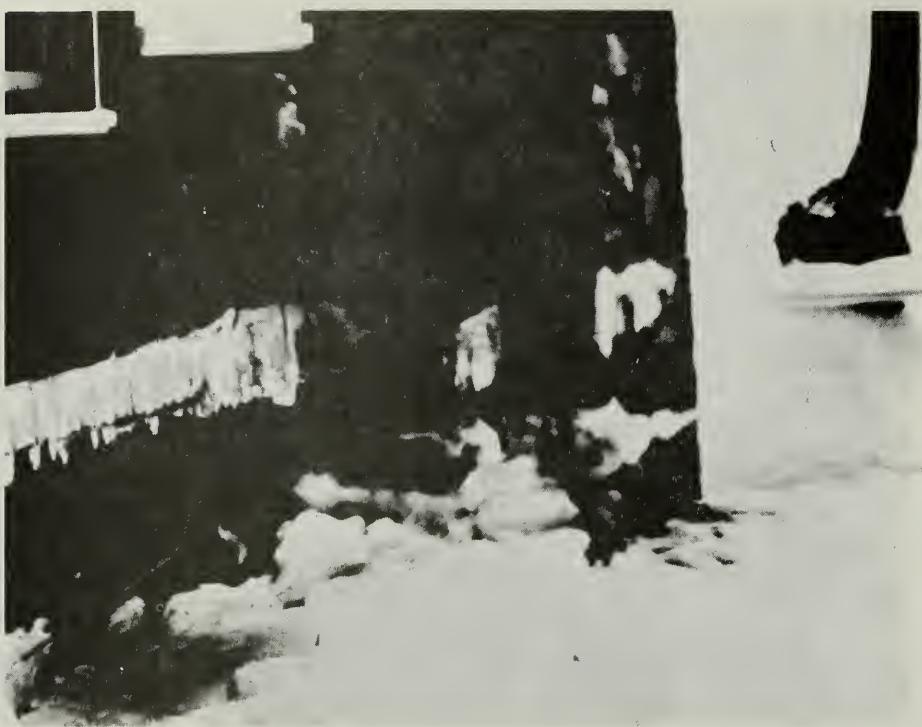
Prairie Road heading north toward Burnham from Unity. The first bridge is in the background. The structural works of improvement will be north of this bridge. December 1973.



Cottage adjacent to Lake Winnebago. Picture shows water entering front door. December 1973.



Agricultural land adjacent to Prairie Road the day after 5½" of rain. November 1966.



A cottage on the shore of Lake Winnecook several days after the water had started to recede. The line of ice on the cottage shows the depth of flooding.
December 1973.



A view of a year-around home on the shores of Lake Winnecook. December 1973.



Cottage adjacent to Lake Winnecook showing water damage. April 1966.



View of the same cottage as above with extensive ice and floodwater damage. Note ice cakes in foreground. December 1973.

to the stream. The thickest observed accumulation of recent overwash measured one inch. Scouring has produced small gullies adjacent to the stream.

Agricultural lands, though a small percentage of the watershed, are seriously damaged by the loss of topsoil and the creation of small gullies in the fields. Sediment and erosion damages add to the owners' operating expenses thereby reducing their net income and, in some cases, produce a loss of usable land. Gross erosion over the entire watershed for a combination of land uses and types of erosion is one-to-two tons per acre per year.

Other sources of sediment and erosion are skid trails, logging roads, and dirt roads. These areas develop gullies and result in sediment deposited in the streams thereby lowering the water quality.

Streambanks are generally stable. Only minor areas of streambank erosion were noted. The urban areas and roadbanks probably produce the major portion of stream sediment. Average annual sediment yield at the mouth of the watershed is estimated to be 29,000 tons. This represents a sediment concentration of 140 milligrams per liter.

Drainage

About 650 acres of cropland, 350 acres of grassland, and 10,450 acres of forest land are affected by wet conditions. These areas are located on the Monarda, Scantic, Leicester, and Limerick soils. The major part of the wet cropland and grassland is located in the eastern and southeastern part of the watershed. The major part of the wet forestland is located in the western and northern parts of the watershed.

Wet conditions delay planting, can limit harvesting, and have a direct effect on the quality and quantity of the crop yield. The table on the following page presents average acreage yields for the various soils found in the watershed.

The 135-day growing season is inadequate to compensate for unusual delays; wet conditions are a critical negative factor in maximizing production. Forest lands likewise suffer limitations due to wet conditions which are reflected in quantity and quality.

Municipal and Industrial Water

The Town of Unity has no municipal water supply system. Private wells serve residences and businesses, and there is one small co-operative water supply system for a group of homes. The town is at a serious disadvantage as far as promoting community growth without having an adequate water supply. This condition exists for all of the communities in the watershed. Approximately 3,800 people live in the watershed and are served by ground water supplies. The wells are usually a low-yield

ESTIMATED AVERAGE ACREAGE YIELD OF VARIOUS CROPS
GROWN UNDER IMPROVED LEVEL OF MANAGEMENT 1/

SOIL TYPE \ CROP	Corn Silage (Tons)	Potatoes (Bu.)	Alfalfa (Tons)	Timothy (Tons)	Grass (Tons)	Pasture (Cow ac.Da.)	Apple (Bu.)
Excessively Well Drained							
Thorndike	16	450	4	3.5	3.5	200	--
Windsor	14	--	3	2.5	2	170	--
Well Drained							
Hartland	30	650	5	4.5	4.5	285	500
Moderately Well Drained							
Dixmont	25	500	4	3	3	230	400
Sutton	22	450	4	4	4	230	500
Deerfield	16	--	3.5	4	4	200	--
Belgrade	24	--	4.5	4	4.5	255	--
Poorly drained							
Monarda	14	--	--	3	3	170	--
Leicester	14	--	--	3.5	4	200	--
Scantic	14	--	--	3	3.5	--	--
Limerick	20	--	--	3.5	4	200	--

1/ Source: Maine Technical Guide, Soil Conservation Service

type but provide adequate supplies for domestic use. Areas for the development of high-yield wells do exist but have not been investigated and delineated. Developed supplies are not adequate for industrial growth beyond present levels.

Recreation

All waters in the watershed, except portions of Carlton Stream and Sandy Stream have been rated at least Class B-2. Carlton and Sandy Streams have been rated as Class C, and are suitable for all recreation except swimming. Recreational water quality problems arise from pollution from septic systems. Inadequate public access to land and water exists because of nearly complete ownership and development by private interests. Access is permitted at the discretion of individual land owners. The Sponsors will give consideration to providing additional public access to Lake Winnecook as the demand arises.

The present population within 25 miles of the watershed is 70,000 people. Population growth has been stagnant but is anticipated to increase at a low rate in the next decade. The influx of summer tourists and recreationists creates an added demand for recreation facilities.

There is no planned construction of public recreation facilities in the watershed. The Maine Comprehensive Outdoor Recreation Plan indicates a need for day-use facilities to accommodate 735 people. Present facilities in the watershed can accommodate about 50 persons.

Fish and Wildlife

According to the U. S. Fish and Wildlife Service and the Maine Department of Inland Fisheries and Game, fluctuating lake levels on Lake Winnecook have a detrimental effect on fish spawning and waterfowl nesting. The exposure of previously submerged spawning areas produces a kill on about 25 acres annually, although this may not be a significant factor to the populations of Lake Winnecook. Waterfowl habitat around the lake is also affected by the drying out of previously flooded wetland. The following table illustrates the area affected by various frequency events. This area is in addition to about 350 acres of normal wetland around the lake.

Frequency Event	Acres Flooded
2 year	460
10 year	480
20 year	500
50 year	620
100 year	650

Water Quality Problems

A monitoring program was begun on Lake Winnebago in 1973 by Unity College. The SCS established a surface water monitoring network on streams in the watershed in April 1974. Since June 1974 this network consists of twenty sampling stations, several of which are located below potential pollution problems. Each station will be sampled ten times yearly.

The following tables show the results of tests to date and the testing schedule that will be followed. The maps show the sampling locations.

LAKE WINNECOOK WATER QUALITY
BACTERIAL TESTS
1973

Collection Site	Lake Station	4/9	4/14	5/11	6/2	7/8	7/12
Open Water	1			0-0 ^{1/}		294-0	
Trailer Park	2			148-0		482-116	
Marina - brook	3			132-0	208-10	254-146	
Brook	4	490-24		1240-20	4-2	352-82	
Brook	5			412-12	236-180		
Brook	6			608-0			
Brook	7			948-40	176-68	114-12	
Brook	8	62-1		508-0	0-8		
Brook	9	20-0		420-136	136-4	362-24	
Brook	10	108-34		228-18		296-TMTC ^{2/}	
Brook	11	228-0				220-30	
Brook	12					488-274	
Brook	13			40-2	108-28	146-18	
Pipe	14			192-2	36-8	TMTC-122	
Brook	15		50-0		108-22	TMTC-TMTC	
Brook	16			216-0	108-24	TMTC-218	
Brook	17	40-0	32-11		192-146	TMTC-TMTC	
Brook	18				100-40	676-274	
Brook	19				60-6		
Brook	20				180-118		
Standing Water	21					TMTC-132	
Trestle	22						
Kanokolus Beach	23						
Sandy Stream	24					352-82	
Open water	25						
Open water	26						
Open water	27						50-6
Open water	28						
Open water	29						
Open water	30						432-0
Open water	31						
Open water	32						
Open water	33						50-6
Open water	34						
Open water	35						

1/ Total coliform - Total fecal--Most probable number per 100 milliliters of water.

2/ TMTC = Greater than 800

Data supplied by C. Rabeni, Unity College.

LAKE WINNECOOK WATER QUALITY
BACTERIAL TESTS
1973

CONTINUED FROM PREVIOUS PAGE

Lake Station	7/21	7/26	7/28	8/4	8/10	8/20	8/25
1					0-0		
2					216-34	<u>1</u>	
3							
4	TMTC-136		TMTC-158		TMTC-TMTC ²		TMTC-TMTC
5	36-8				106-4		8-0
6	TMTC-TMTC		TMTC-44		TMTC-TMTC		TMTC-TMTC
7	78-4				TMTC-38		66-2
8	TMTC-140						146-20
9	54-14				TMTC-104		
10	154-16		230-170				108-30
11	114-24				TMTC-TMTC		88-26
12					TMTC-TMTC		
13	TMTC-TMTC		TMTC-260		TMTC-TMTC		
14	TMTC-TMTC		416-74		TMTC-146		114-16
15	0-16				TMTC-TMTC		
16	14-0						
17	220-40				TMTC-58		TMTC-TMTC
18	TMTC-TMTC		30-2		400-TMTC		42-170
19							
20							
21							
22					TMTC-184		
23					88-26		
24					TMTC-404		
25					TMTC-TMTC		
26		4-0					
27							
28		96-6					
29					40-4		
30							
31					TMTC-6		
32			16-2			18-6	
33							
34		80-2					
35				88-26			

1/ Total Coliform - Total fecal--Most probable number per 100 milliliters of water.

2/ TMTC = Greater than 800

Data supplied by C. Rabeni, Unity College.

TWENTYFIVE MILE STREAM WATERSHED

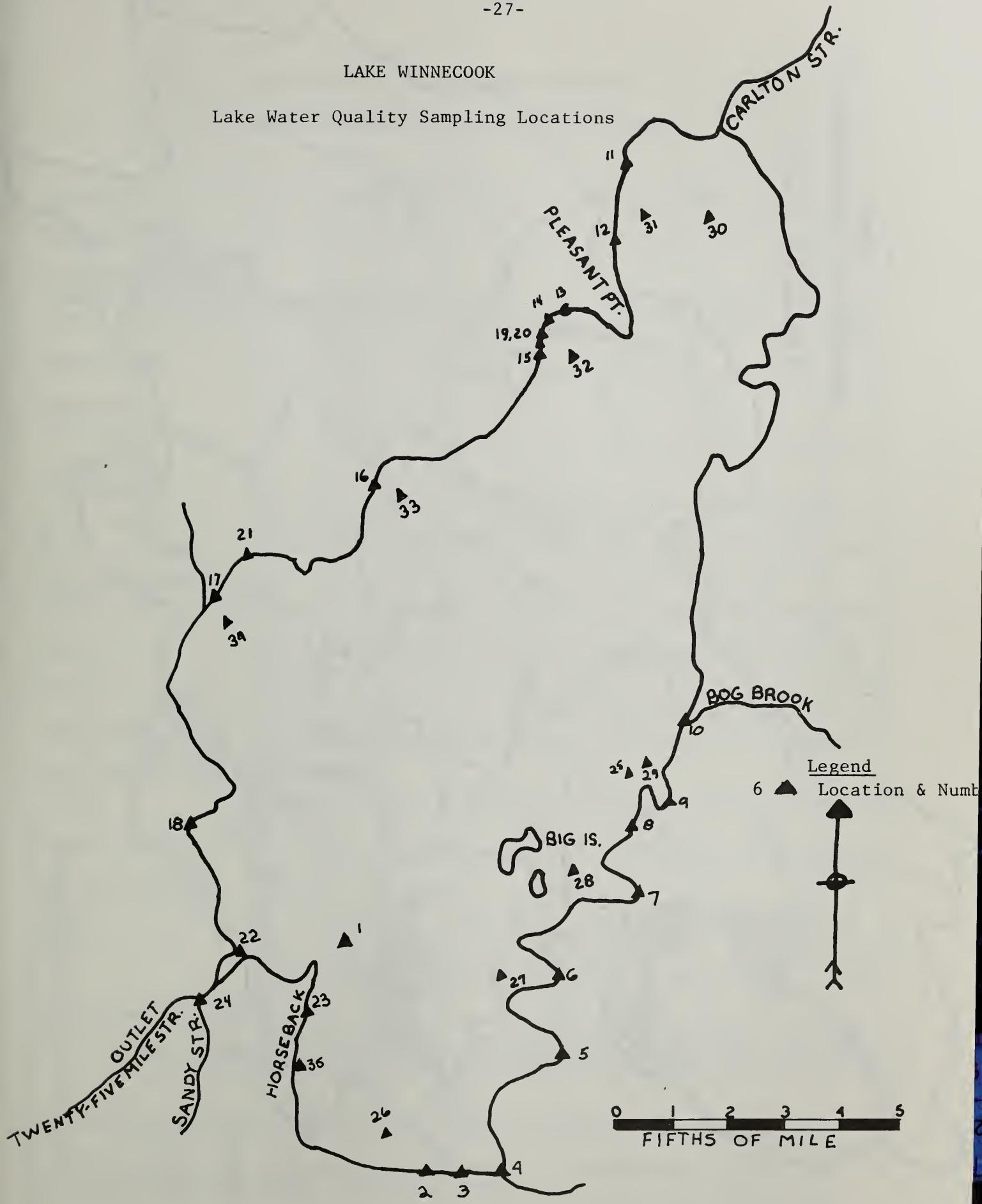
INITIAL STREAM BACTERIAL SAMPLES
1974

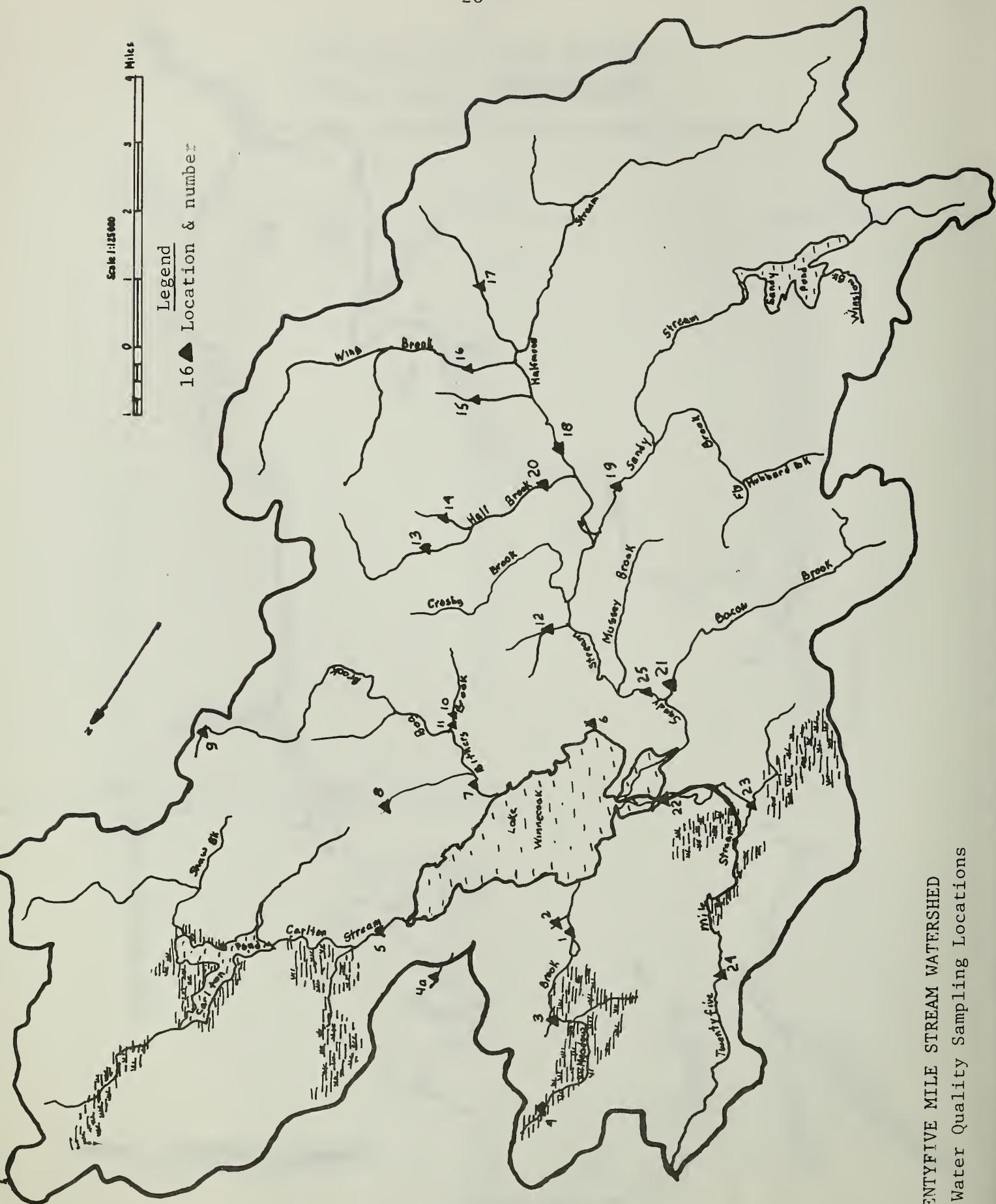
Stream Station	April 29 Total	May 6 Total	May 6 Fecal
1	320 <u>1/</u>	100	4
2	75	32	0
3	28	68	0
4	37	28	0
5	104	120	8
6	1480	428	2
7	436	180	0
8	97	172	0
9	62	244	0
10	45	468	0
11	9	248	0
12	63	160	3
13	42	11,900	89
14	114	156	4
15	54	160	0
16	27	80	1
17	43	100	0
18	77	156	3
19	78	232	0
20	64	96	0
21	49	116	0
4a	--	68	0

1/ Coliform per 100 milliliters.
(See map for sample locations)

LAKE WINNECOOK

Lake Water Quality Sampling Locations





TWENTYFIVE MILE STREAM WATERSHED

Stream Water Quality Sampling Locations

TWENTYFIVE MILE STREAM WATERSHED

AVERAGE 3/ WATER QUALITY VALUES BY MONTH

Measurement	1974						1975			
	Jun	Jul	Aug	Sep	Oct	Nov	Jan	Mar	Apr	May
Coliform bacteria										
Total (no. colonies)	1049	5034	365	503	55	30	18	572	7.4	115
Fecal (no. colonies)	79	160	97	200	10	1.5	3	27	0.6	98
Oxygen (ppm)	9.1	8.1	7.7	9.4	12.5	14.0	14.7	15	14.7	11.8
Turbidity (Set. solids)	--	0.86	0.91	1.10	---	---	---	2.5	---	---
Conductivity (umhos/cm)	77	73	93	86	86	96	86	74	64	80
pH	7.1	6.9	6.9	6.9	6.8	6.6	7.0	6.5	6.8	6.8
Total suspended Solids (ppm)	--	1.7	2.4	1.1	0.0	0.6	0.0	10.0	0.0	0.0
Color	--	---	37	---	---	---	---	---	---	---
Flow <u>1/</u>	X	X	X	X	X	X	X	X	X	X
Temperature (C)	21	19.8	20.1	15.8	5.2	0.2	0.4	2.3	4.6	16.2
Total Alkalinity (ppm)	20	17.9	20.5	24	24.8	24.6	22.0	18.8	16.1	25
Hardness (ppm)	24	20.3	22.9	21.9	23.1	21.8	21.6	16.5	15	22
Nitrates (ppm) <u>2/</u>										
NH ₃ -N	--	.04	.038	.020	.039	.017	.08	.08	.022	.032
NO ₃ -N	--	.97	.01	.01	.091	.15	{.40	{.59	{.21	.24
NO ₂ -N	--	.01	.26	.16	.01	.35	{.36	{.41	{.27	.36
TK-N	--	.62	.41	.28	.38	.53				
Phosphates (ppm) <u>2/</u>										
Total P	--	.003	.028	.033	.02	.024	.025	.066	.019	.031
Organic carbon (ppm)	--	8.7	3.8	2.3	4.9	6.0	4.7	3.6	---	5.5

1/ Stages are recorded. Ratings will be accomplished in Winter 1975- 76.

2/ These samples were collected and delivered to the Department of Environmental Protection in Augusta, Maine.

3/ Average of all stations.

The surface water quality monitoring network will be modified after the first sampling year to represent key locations. This monitoring will continue into the post-construction period. Benthic studies are presently being conducted. These also will be continued after construction. Other pre- and post-construction studies will be conducted to evaluate the impacts on fish and wildlife resources as they are deemed necessary.

The results to date have revealed the streams in the watershed receive very little bacterial contamination. Only two stations revealed abnormally high bacterial counts. Lake Winnecook, however, has a degraded water quality due to the influence of lake shore cottages. The bacterial contamination is most severe along the shore during the summer months and lessens during the winter. Although classified "B-1" by the state, the water along the edges of the lake falls below the "B-1" standards during the summer months.

Economic and Social

Over 95 percent of the farms in the watershed are family farms. Low-income-producing units with gross sales of less than \$20,000 represent about 35 percent of the farms. Twenty-five percent of the farm units are below the poverty level net income of \$4,000.

This watershed is within the area designated as the New England Economic Development Region and is eligible for using redevelopment benefits under the Public Works and Economic Development Act of 1965. According to May 1975 data, unemployment was 10.0 percent in Waldo County. The national average was 8.3 percent. The number of farms in Waldo County has decreased from 942 in 1964 to 517 in 1969 and the reduction of cropland acreage from 43,000 acres to 31,000 acres reflects the decrease. Additional employment opportunities are needed to fill the void created by the closing of many farms.

Approximately 25 percent of the soils within the watershed have suitable characteristics for septic sewage disposal. It is estimated, however, that over half of the existing dwellings in the watershed are located on soils that have limitations for septic sewage disposal. Only one community in the watershed has public sewage services available. Consequently, ground and surface waters are threatened by poorly functioning on-site waste disposal systems.

In recent years there has been an increase of non-agricultural people building homes in the watershed. Very little of the development that has taken place has occurred on a planned basis. Most of the homes have been built on poorly suited soils for on-site waste disposal, and they have been developed in an unplanned, scattered manner. Unplanned development has contributed to high public service costs such as roads, schools, fire, police, and utilities and to location of residents near farming areas. Farm practices that result in air pollution and noise are considered intolerable by these new non-agricultural home builders. There is a definite need for planning carried out at all levels: individual, group, and unit of government.

PROJECTS OF OTHER AGENCIES

The works of improvement included in this plan will be an integral part of a coordinated development for the Kennebec River Basin. Work on the Twentyfive Mile Stream Watershed will have no adverse effect on any existing or proposed projects.

A public access area, boat ramp, picnic tables, and a parking area have been constructed on Sandy Stream by the Maine Bureau of Parks and Recreation.

PROJECT FORMULATION

There is no comprehensive river basin plan or resource conservation and development plan covering the project area.

The local sponsors, fish and wildlife interests, landowners, and conservation interests were involved in the process of developing this project. The following tabulation chronicles the coordination with and input of various groups.

March 1964	Sponsors organized and submitted their application for a watershed project.
April 1964	State Soil Conservation Commission approved application.
June 1964	State Soil Conservation Commission requested a field review.
October 5, 1964	Public information meeting held in Unity.
October 12, 1964	Meeting held with Maine Department of Inland Fisheries and Game, U. S. Fish and Wildlife Service and sponsors.
October 13, 1964	Field review completed and distributed to interested parties.
October 28, 1964	State Soil Conservation Commission approved the field review and requested Preliminary Investigation.
November 2, 1964	Application sent to SCS Administrator.

November 9, 1964 U. S. Army Corps of Engineers notified.

August 20, 1965 Preliminary Investigation (P.I.) completed and distributed.

August 23, 1965 Sponsors met to discuss the findings of the Preliminary Investigation.

October 6, 1965 State Soil Conservation Commission approved the P.I. and submitted its recommendations to SCS Administrator.

October 18, 1965 Application approved by the SCS Administrator.

October 1965 Sponsors and SCS requested participation and/or comments from the following agencies, organizations and persons in the work plan development:

SCS, Technical Service Center, Upper Darby, Pa.

SCS Engineering and Watershed Planning Unit, Upper Darby, Pa.

SCS Regional Biologist, TSC, Upper Darby, Pa.

SCS Regional Agronomist, TSC, Upper Darby, Pa.

SCS Regional Woodland Conservationist, TSC, Upper Darby, Pa.

SCS Regional Resource Development Specialist, TSC, Upper Darby, Pa.

Asst. Regional Forester, U. S. Forest Service - Eastern Region, 6816 Market St., Upper Darby, Pa.

Regional Director, U. S. Dept. of Health, Education and Welfare, 120 Boylston St., Boston, Mass.

Area Director, Area I, Mineral Resource Office, Bureau of Mines, U. S. Dept. of the Interior, 4800 Forbes St., Pittsburg, Pa.

Deputy Division Engineer, U. S. Army Corps of Engineers, 424 Trapelo Road, Waltham, Mass.

Regional Supervisor, Branch of River Basin Studies, U. S. Fish and Wildlife Service, 59 Temple Place, Boston, Mass.

Supervisor, Concord Area Office, U. S. Fish and Wildlife Service, 3 Pleasant St., Concord, N.H.

Regional Director, Bureau of Outdoor Recreation, U. S. Department of the Interior, U. S. Court House, 9th and Chestnut St., Philadelphia, Pa.

Regional Director, Bureau of Sport Fisheries and Wildlife, 59 Temple Place, Boston, Mass.

Regional Biologist, SCS, Federal Bldg., Durham, N.H.

Regional Conservation Agronomist, SCS, 29-Cottage St., Amherst, Mass.

State Director, Agricultural Stabilization and Conservation Service, USDA Office Bldg., University of Maine, Orono, Maine

Agricultural Research Service, University of Maine, Orono, Maine

District Engineer, Water Resources Division, U. S. Geological Survey, Vickery-Hill Bldg., Court Street, Augusta, Maine

State Director, Farmers Home Administration, USDA Office Bldg., Orono, Maine

Chairman, Maine Soil Conservation Commission, Augusta, Maine

Executive Secretary, Maine Soil Conservation Commission, Augusta, Maine

Dean, College of Agriculture, University of Maine, Orono, Maine

Commissioner, Maine Forest Service, State House, Augusta, Maine

Atwood and Blackwell, 5 Boylston Place, Boston, Mass.

Penobscot Development Company

Great Northern Paper Co., 6 State Street, Bangor, Maine

James Sewall Company, 147 Center Street, Old Town, Maine

Commissioner, Maine Public Utilities Commission, State House, Augusta, Maine

Commissioner, Maine Department of Economic Development, State House, Augusta, Maine

Associate Director, Cooperative Extension Service,
University of Maine, Orono, Maine

Director, Agricultural Experiment Station, Uni-
versity of Maine, Orono, Maine

Director, Division of Sanitary Engineering, Dept. of
Health and Welfare, Augusta, Maine

Commissioner, Maine Health and Welfare Dept., State
House, Augusta, Maine

Commissioner, Maine Dept. of Inland Fisheries and
Game, State House, Augusta, Maine

Dept. of Inland Fisheries and Game, University of
Maine, Orono, Maine

Chairman, Maine State Highway Commission, State
House, Augusta, Maine

Engineer of Federal Aid and State Highways, State
Highway Dept., Augusta, Maine

Division Engineer, State Highway Dept., Box 1940,
Portland, Maine

Director of State Parks, State Park and Recreation
Commission, State House, Augusta, Maine

Commissioner, Maine Sea & Shore Fisheries, Augusta,
Maine

School of Forestry, University of Maine, Orono,
Maine

The Maine Townsman, Executive Secretary of Maine
Municipal Assn., 89 Water Street, Hallowell, Maine

Master of State Grange, West Minot, Maine

Executive Secretary, Maine Farm Bureau, Water
Street, Augusta, Maine

Comments were received from the following agencies:

Maine Dept. of Sea and Shore Fisheries

U. S. Dept. of the Interior, Bureau of Mines

Atwood and Blackwell Co.

U. S. Dept. of Health, Education and Welfare

U. S. Dept. of Agriculture, Maine Agricultural
Stabilization and Conservation Service

U. S. Dept. of the Interior, Bureau of Sport
Fisheries and Wildlife

U. S. Dept. of Agriculture, SCS Regional
Biologist

Maine Dept. of Inland Fisheries and Game

U. S. Dept. of Agriculture, Forest Service

February 23, 1966 SCS met with Maine Dept. of Inland Fisheries and Game.

February 27, 1967 Sponsors' meeting; Maine Inland Fisheries and Game, State Senator and Representatives, sponsors and SCS in attendance.

September 30, 1968 Sponsors' meeting; Unity Selectmen, SCS, local fish and game club in attendance.

March 14, 1970 Project discussed at the Unity Town Meeting.

January 1971 First draft of work plan completed and distributed to the following agencies and people for comment:

U. S. Dept. of Agriculture, Forest Service
U. S. Dept. of the Interior, Fish and Wildlife
Service

Maine Dept. of Inland Fisheries and Game
Maine State Highway Commission
Sponsors

Comments were received on the first draft of the work plan from the following agencies:

U.S.D.A., Forest Service
Maine Department of Transportation
U.S.D.I., Fish & Wildlife Service
U.S.D.A., SCS, Technical Service Center

March 9, 1971	Project discussed by SCS with Waldo County Commissioners, and Commissioners endorsed project.
May 21, 1971	National Park Service, Maine Historical Society, and Dept. of Anthropology, University of Maine were requested to assist in locating and evaluating places of historical or archeological value in the watershed.
August 1971	SCS met with selectmen of Burnham, Unity, and Troy.
August 30, 1971	Public meeting in Unity
December 13, 1971	Open meeting - Unity officials met with SCS to review landrights procedures.
April 24, 1972	SCS met with selectmen of Burnham to discuss landrights.
August 29, 1972	SCS met with sponsors to discuss landrights.
September 7, 1972	SCS met with Burnham officials and landowner to discuss easements.
October 19, 1972	Informational meeting open to the general public in the project area.
December 12, 1972	SCS and Maine Inland Fisheries and Game review the project in the field.
October 10, 1973	U. S. Dept. of the Interior, Fish and Wildlife Service submitted their Post Authorization Report for the watershed.
During formulation of the plan, press coverage was provided to inform the general public.	
During the Spring of 1974, Mr. Charles Rabeni, Aquatic Biologist, of Unity College was contracted to conduct a water quality monitoring program in the watershed and a preconstruction investigation of the benthic invertebrate community in Twentyfive Mile Stream. Both of these studies are ongoing with the first reports due in winter 1975-76. Water Quality data to date is presented on Pages 23-30.	
November 14, 1974	Informal field review was held.
December 16, 1974	A tour of the watershed was conducted. The following people were sent copies of the draft Watershed Work Plan and Environmental Impact Statement and invited to attend the field trip: (Asterisk indicates people who did attend or sent representatives.)

Mr. Wendall Trembly
Executive Director
Maine Fish and Game Assoc.

Mr. Sterling Dow III
Executive Director
Maine Assoc. of Conservation Com.

Mr. Richard Anderson
Executive Director
Maine Audubon Society

*Mr. Clifford Goodall
Executive Director
Natural Resources Council

Mr. Jeffrey Carlin, President
Trout Unlimited, Sunkhaze Chapter

Mr. John Cole, Editor
Maine Times

*Mr. Marshal Stone, Editor
Bangor Daily News

Mr. Steve Curtis, Editor
Republican Journal

*Dr. William H. Gilbert, President
State Biologists Association
Colby College

*Mr. Dana Stephenson
First Selectman
Unity, Maine

*Mr. Kenneth Murch
County Commissioner
Unity, Maine

Mr. Phillip Patten
First Selectman
Troy, Maine

Mr. Ralph Huff
First Selectman
Burnham, Maine

Ms. Patricia Stimetz
Executive Secretary
Congress of Lakes Association

*Mr. Harry Friedman, Chairman
Waldo County Soil & Water
Conservation District

*Mr. Charles Ritze, Biologist
Maine Department of Inland
Fisheries and Game

*Mr. Richard L. Duesterhaus
State Conservationist
Soil Conservation Service

*Mr. Lauren H. Long
State Resource Conservationist
Soil Conservation Service

*Mr. Arthur Dearborn III
Watershed Planning Staff
Leader, Soil Conservation
Service

*Mr. Richard Davidson
District Conservationist
(Belfast)
Soil Conservation Service

*Mr. Charles Boothby
Executive Director
Maine Soil & Water Conservation
Commission

ADDITIONAL PEOPLE IN ATTENDANCE

Mr. Gerald Fowler
Supervisor
Waldo County Soil & Water
Conservation District

Mr. Norman Soderberg
Bangor Daily News
Unity Correspondent

ADDITIONAL PEOPLE IN ATTENDANCE

Dr. Jan F. Sassaman
Unity Planning Board
State Biologists Assn. Board Member
Unity College

Dr. J. Mudge
State Biologists Association
University of Maine
Farmington, Maine

Mr. Gary Donavan, Biologist
Maine Department of Inland
Fisheries & Game

Objectives

As originally stated in the application, the Sponsors' primary objectives are watershed protection and flood prevention. In order to solve or alleviate most of the watershed problems, the Sponsors of the watershed project agreed to the following objectives:

1. Land treatment will be applied to those lands in need of conservation practices. Land treatment measures will improve production and management and will provide a basis for farmers in the low-income category to improve their economic status, reduce erosion, soil loss, and potential animal waste disposal problems, provide for drainage, and improve forest hydrologic conditions.
2. A 100-year level of flood protection will be provided to lake shore properties, recreational developments, and rural homes on Lake Winnecook. A 5-year level of flood protection will be provided to agricultural land below Prairie Road, and a 30-year level of protection will be provided to roads and bridges downstream from Lake Winnecook.
3. Preservation and improvement of existing fish and game resources will be emphasized by assisting landowners in developing and installing a conservation plan. The structural measures will be coordinated with the Maine Department of Inland Fisheries and Game and the U. S. Fish and Wildlife Service.
4. Accelerate the standard soil survey and flood plain information studies to provide basic resource information for making land use and zoning decisions. This will provide the necessary information to plan for new development and alleviate potential pollution problems stemming from septic tanks.

Environmental Considerations

In order to meet the objectives of the project, several alternative means were considered. The environmental effect of these alternatives was considered in the light of the benefits to be achieved. The nature of the situation allowed very few alternatives to achieve flood control around and below Lake Winnecook.

The primary effect which consistently arose when evaluating the benefits and effects was the change in fish and wildlife habitat.

In order to fully understand the fish and wildlife aspects of the alternatives, the sponsors coordinated their studies with the Maine Department of Inland Fisheries and Game and the U. S. Fish and Wildlife Service. The plan selected by the sponsors maximized flood control, economic and

overall environmental quality benefits, and also the plan which presented a significant change in wildlife habitat. The channel clearing and snagging, deepening, straightening and enlarging, and emplacement of structures have a combined effect of reducing flood frequencies on 800 acres of Type 7 wetland, reducing wildlife cover, changing water characteristics, increasing short-term sedimentation, and decreasing the length of a natural stream. Favorable consequences and planned mitigation, as part of the project, have the effect of diminishing the overall impact of these changes. The flood control will permit stabilized lake levels and create a better situation for lake spawning fish and duck nesting. The land treatment will emphasize improved upland conditions and increased vegetation for wildlife. Construction will make 35,000 yd² of fish nursery area and 4 of 5 resting pools available in Twenty-five Mile Stream. Plantings and management of vegetation for wildlife along the channel will increase the food supply for wildlife.

Alternatives

Several alternatives were considered in the planning process to determine a system which would meet project objectives. The following are several of the nonstructural and structural systems which were considered:

Nonstructural

No Project - The No Project alternative would generate none of the adverse effects nor create any of the favorable effects of the planned project.

State and local laws and regulations would govern the development of the 10 cottage sites which are available on the lakefront. The 157 homes and properties, other rural homes, roads, and 180 acres of agricultural land will remain subject to flooding.

Annual average benefits foregone will amount to about \$40,000.

Land Treatment Only - This alternative is the same land treatment program which is proposed in the plan. All benefits and effects described for the land treatment phase of the proposed plan would result if this alternative were used.

Runoff from the watershed will be reduced by less than 2.5 percent. The level of protection provided to agricultural land is less than the 5-year frequency storm. Flood protection provided to lake shore homes and properties, rural homes, and recreational developments is less than the 100-year level desired.

The fish and wildlife habitat downstream from Lake Winnecook would not be disturbed. The habitat in and around the lake would continue to be subject to wide fluctuations of the lake level.

The estimated cost of this alternative is \$747,700.

Land Treatment, Relocation of Existing Cottages and Flood Plain Zoning -
The land treatment is the same as the land treatment phase of the planned project. All benefits and effects will be produced from land treatment as previously described.

A flood hazard analysis would be performed to provide a more exact delineation of the flooded area. In order to avoid first-floor damages, about 87 cottages would be relocated, and sufficient peripheral land purchased and zoned to accommodate runoff from the design storm. The roads which are inundated would be raised to a flood-free elevation and the bridge on Prairie Road would be enlarged.

The raising of Prairie Road would deny its use for weir flow and higher lake stages would be created. Additional agricultural land would be inundated by the increased lake stages. Relocation of the cottages would require the commitment of other lands to development and additional land would be required for the installation of service facilities at the new location.

Borrow pits would be excavated to supply fill material for road improvements. Channel excavation would be required for the installation of new bridges. The development of about 10 additional cottage sites would be possible. Fishery and wildlife habitat would remain subject to widely fluctuating lake levels. Increased traffic between the construction sites would increase congestion, noise, and air pollution during the construction period.

The estimated cost of this alternative is about 3.25 million dollars.

Structural

Land Treatment and Floodwater Retarding Structures - A system which incorporated land treatment and eight floodwater retarding structures was evaluated, and other evaluations within this framework were made in which land treatment and various combinations of the eight floodwater retarding structures were used.

The land treatment in this alternative is the same as the land treatment phase of the planned project. All benefits and effects produced by the land treatment program in the planned project will result from the installation of land treatment in this alternative. Runoff will be reduced by less than 2.5 percent.

The installation of eight floodwater retarding structures would require the commitment of approximately 3650 acres to the purposes of sediment and floodwater storage, and to the dams and their appurtenances. Twenty-nine hundred and fifty acres of wetland habitat and 700 acres of upland game habitat would be committed to these purposes. Fishery habitat on 2,000 feet of stream would be destroyed by the installation of the dams, and no stream habitat would be inundated since all structures were considered to be dry structures. No warm water fisheries would be created by the impoundments. Upland game habitat of 40 acres would be created by the establishment of grass and shrubs on the dams, spillways, and borrow areas.

The impoundment of runoff by the structures would have very little effect on the level of flooding around Lake Winnecook due to the poor discharge efficiency of the outlet channel from the lake.

The estimated cost of this alternative is in excess of 2.5 million dollars.

Land Treatment, Floodway and Channel Excavation - The land treatment would be the same as in the proposed plan, and all benefits and effects would be the same.

A floodway would be constructed parallel to Highway 139 to connect Sandy Stream with Twentyfive Mile Stream. The channel of Twentyfive Mile Stream would be excavated a distance of 1,600 feet to improve the discharge efficiency.

This alternative would permit flood flows to bypass the damage area around Lake Winnecook and be discharged into the Twentyfive Mile Stream channel west of Highway 139.

The floodway would require 15 acres of land which would be established in vegetation and shrubs adapted to the site. Stream habitat on 1600 feet of Twentyfive Mile Stream would be modified. Wildlife habitat along the channel would be improved by diversifying the habitat from wooded to the open areas along the channel where the spoil is spread.

Topography along the route of the proposed floodway will require the use of numerous reinforced concrete grade control structures to establish a stable grade. Annual operations and maintenance costs will be high.

The estimated cost of this alternative is in excess of 2 million dollars.

Land Treatment and Floodway Adjacent to Twentyfive Mile Stream

The land treatment portion of this alternative would be the same as in the proposed plan and would result in the same benefits and effects attributable to land treatment.

A floodway completely separate from the channel would be constructed on the north side of Twentyfive Mile Stream from Lake Winnecook to a point downstream of the proposed channel work area. The dimensions of the floodway would be essentially the same as those of the channel proposed in the plan. Ledge excavation would also be required. Excavation quantities would be greater by about 25 percent. Additional land easements would be necessary. Thirty acres of farm and woodland would be committed to the floodway.

Alteration of the existing channel would be required at both the upstream and downstream ends of the floodway, with extensive alteration at the upstream end. The present bridge would remain and an additional bridge box inlet structure would be constructed north of the present bridge. A

type "C" drop structure would be constructed on the floodway and would be connected to the Lake Winnecook outlet and the natural channel by a by-pass channel. Provisions would be made to discharge the baseflow through the natural channel and divert the flood flows through the floodway. Vector control would be a problem. Operation and maintenance costs would be greater since continuous flows would not be maintained in the floodway. Installation costs would be about 25 percent greater.

Reason for Selecting Planned Project

The planned project consists of land treatment and structural measures. Structural measures include a Type C drop structure, a bridge inlet drop structure, and 9,500 feet of channel work. This project was selected by the sponsors as the best means to meet their objectives with the least disturbance to the environment.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment

The purpose of land treatment is to provide protection to land which is presently subject to erosion and other problems. The physical characteristics of the soil also will be improved, thus providing for greater infiltration and percolation rates, increasing water storage capacity, and reducing runoff. These measures complement the structural works of improvement and help to bring about the realization of the project objectives and assure project benefits.

The land treatment phases of this plan include adequate treatment of 2,282 acres of cropland, 7,842 acres of grassland, and 17,200 acres of forestland. The purpose of this land treatment program is to provide multiple-use management and direction to the landowners and to protect and improve the resources of the watershed through land and water conservation practices. The planned treatment of 27,324 acres will be composed of applicable soil and water conservation practices. The planned treatment of cropland includes diversions, conservation cropping systems, contour farming, crop residue management, ponds, obstruction removal, grassed waterways, and tile drains. For grassland, the practices include pastureland and hayland management, brush control, wildlife habitat development, pastureland and hayland renovation, and ponds. Forestland practices include tree planting, managed tree harvesting and improvement cuts, and erosion control of skid trails and logging roads. The planned agricultural waste management practices will entail the disposal of manure by spreading and recycling it through various crops based on the Maine Guidelines for Manure and Manure Sludge Disposal On Land. Pits and selected sites will be used to store the manure during the winter months.

Technical assistance for planning and application of these measures, normally available through on-going conservation programs, will be continued at the rate that existed prior to the development of this plan and include technical services to be provided by the Soil Conservation

Service and by the Maine Bureau of Forestry in cooperation with the U. S. Forest Service. Thirteen man-years of additional technical assistance is planned through the use of PL-566 funds to accelerate the rate of application of land treatment. The soil survey mapping is scheduled to be completed by November 1978 in Waldo County.

Technical assistance is involved in (a) stimulation of landowner interest and participation in the watershed program; (b) general planning, supervision, and inspection of the land treatment phase of the program; and (c) assistance to individual landowners in installing the measures on their land.

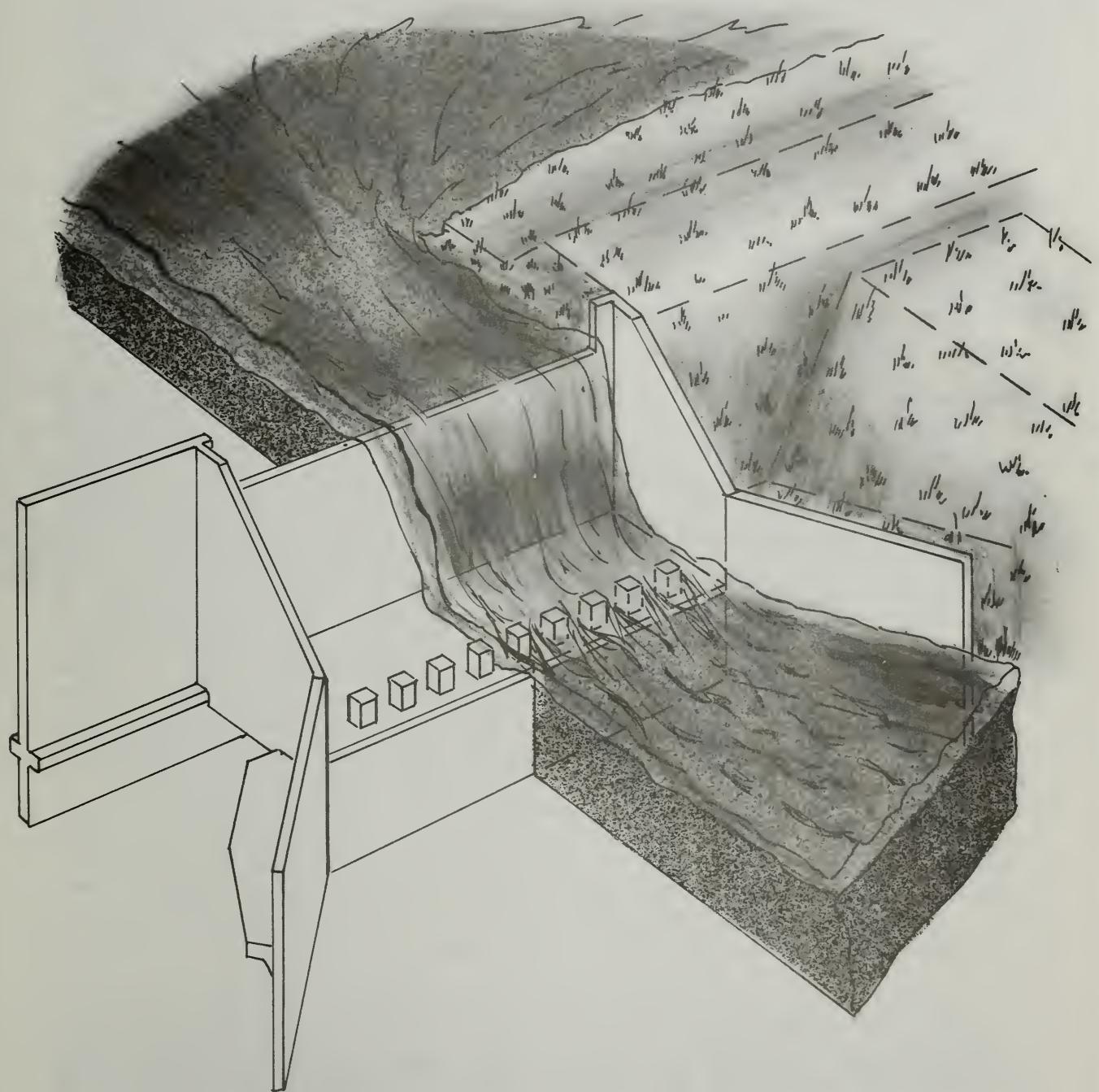
Structural Measures

The structural system selected was found to produce the desired results at least cost with an acceptable disturbance to the natural environment. It consists of 1,500 feet of intermittent clearing and snagging in a 3,400-foot reach of the outlet channel of Lake Winnecook, a Type C drop structure 3,400 feet below the lake, a box inlet drop structure with provisions for a bridge at Prairie Road, 9,500 feet of channel realignment and enlargement, and fills placed on the upstream and downstream end of four cutoff meanders.

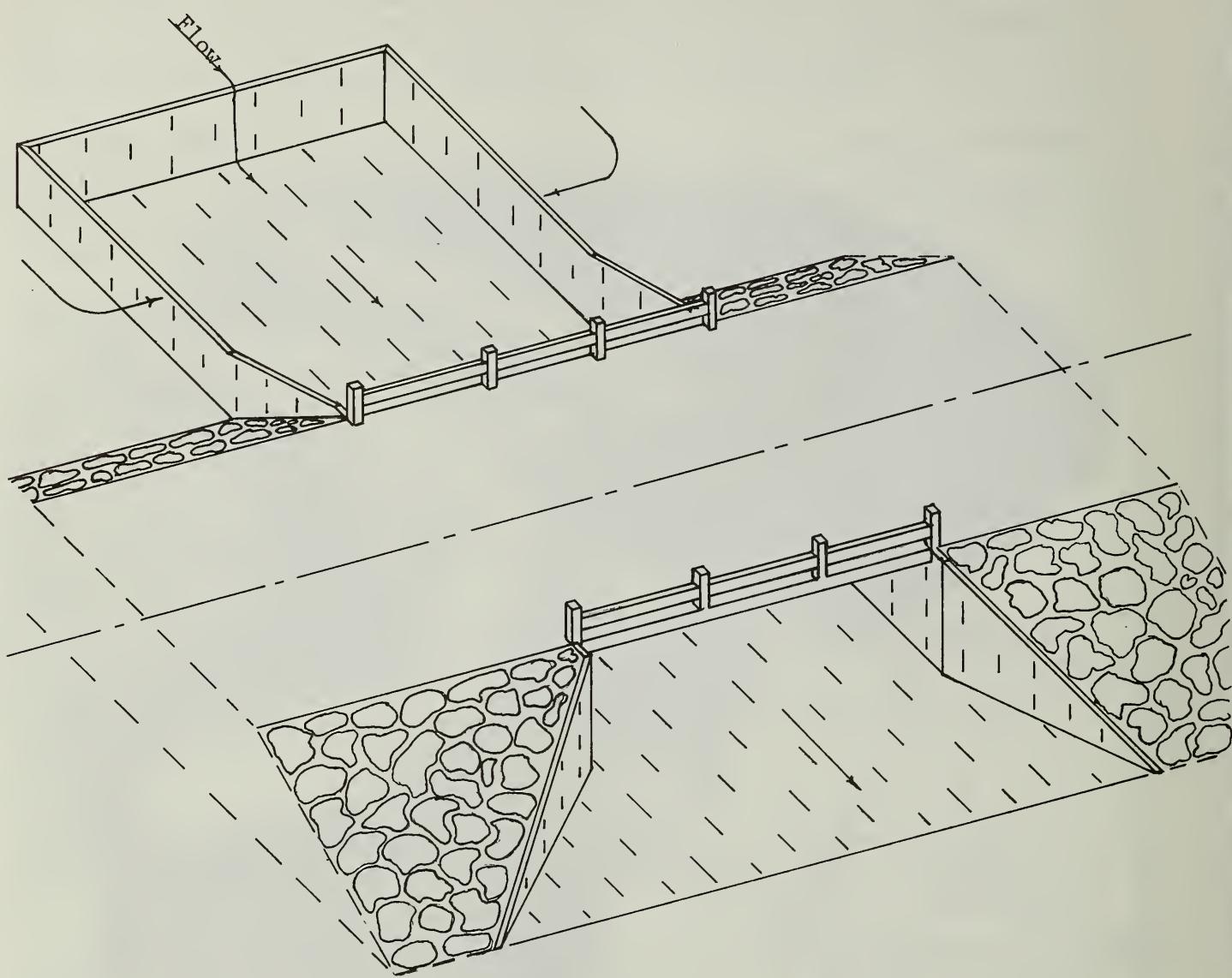
Selective clearing and snagging will be performed on about 1,500 feet of the 3,400-foot-long Twentyfive Mile Stream channel between Lake Winnecook and Prairie Road. This work will consist of removing selected trees, logs, stumps, debris, and brush necessary to improve the flow characteristics of the existing channel.

A Type C drop structure with a weir length of 100 feet and a drop of 5.0 feet will be installed in Twentyfive Mile Stream channel about 3,400 feet downstream from the lake. The structure will consist of about 120 cu. yds. of reinforced concrete on a foundation of deep sands and silts.

A combination box inlet drop structure and bridge with an approximate total weir length of 82 feet, a drop of six feet, and peak design capacity of 5,780 cfs will be installed in Twentyfive Mile Stream about 4,000 feet downstream from the lake. The structure, including the bridge, will consist of 435 cu. yds. of reinforced concrete and be constructed on firm soil or bedrock, if placed in the same location as the present bridge. Seismic hazard has been considered in the design of both concrete structures.



TYPICAL VIEW OF A TYPE C DROP STRUCTURE



TYPICAL VIEW OF BOX INLET DROP STRUCTURE

Twentyfive Mile Stream below Prairie Road will be straightened and enlarged for a distance of 9,500 feet. The channel will have a bottom width of 100 feet, an average depth of 10 feet and a design capacity ranging from 6,600 to 6,850 cfs. Bedrock is generally shallow along most of the channel. Deposits of marine sand and silt generally overlay the bedrock with till or outwash located intermittently beneath them. The channel bottom will be cut into rock at six intermediate reaches along the channel. Located between the bedrock reaches are pockets of interlayered sand and silt and gravelly glacial till. The pockets between the rocks will be excavated about two to four feet below grade to serve as pools for fish. The reaches of bedrock will assure a stable channel bottom and are expected to maintain the channel pools below them. During construction, the bedrock surface will be drilled and blasted about one foot below the desired channel grade. The one-foot layer of broken rock will be left in the channel bottom and it is expected that this area of about 35,000 square yards will serve as a food-producing area for the fishery resources of Twentyfive Mile Stream. It will not serve as brook trout nursery area because of shallow water, low flows, and high summer temperatures; warm water fish will use deeper areas as nursery areas.

Spoil will be placed on the north side of the stream channel as much as practicable; in addition, large trees will be left on the south side for shade. Channel side slopes will be 1 to 1 or steeper in rock cuts through the reaches where widening of the existing channel is planned. The rock overburden will be used for riprap to prevent undercutting and ensure stable side slopes in areas where the channel banks are silt and sand. Only one existing bank will be disturbed, wherever possible, in an effort to protect fish and wildlife values. All oxbows will be diked on the upstream side. The lower end of the meanders will be blocked by placement of surplus excavated rock to form low dikes which will retain water in part of the older meanders during times of low flow. These dikes or sills will be designed to allow spillage back into the meanders during high water periods and retain this water at times of low flows. The dimensions of these sills will be variable but will be high enough to inundate, if possible, most of the backwater areas (two to four feet appears to be adequate). Two sills will be installed on the large oxbow, located 3,000 feet downstream of Prairie Road. One sill will be placed on the downstream end of the oxbow, and one approximately 1,500 feet upstream in the meander. The heights of these sills will be three and two feet, respectively. All activities in the project will be coordinated with the Maine Department of Inland Fisheries and Game.

The spoil from the channel work will be disposed of to open up the woodlands and create diversity in the habitat conditions. This spoil will be placed in piles about 150 feet apart along the streambank. The piles will then be leveled in a zig-zag pattern away from the streambank for about 200 feet in length and 50 feet in width.

Additional spoil will be piled between the lateral banks on the streambank and the oxbows to serve as nesting and resting islands. The size

of the islands will approximate 10 square feet at the crown and rise 2 to 4 feet above maximum high-water level. All of these areas will be seeded with appropriate grass, legume, and shrub mixtures of proven value to wildlife. The specific locations for these will be coordinated with the Maine Department of Inland Fisheries and Game to insure proper placement of spoil and minimum disturbance to surrounding areas.

Settling basins or silt traps will be placed downstream of all proposed channel excavations. The excavation will start upstream and proceed downstream. The current will flush disturbed material into the traps. Blasting of rock ledges and excavation of the gravel pockets will proceed in a similar manner.

The selective clearing and snagging, the Type C drop structure, the bridge box inlet structure, and the channel improvement are all interrelated and interdependent and function as a floodwater retarding structure. Each work of improvement plays a part in controlling the discharge of Lake Winnecook. The selective clearing and snagging of trees and debris above the drop structure will improve the flow characteristics of the floodwaters entering the Type C drop structure from the lake and will ensure the same water elevations in the lake as at the structure. The Type C drop structure and bridge box inlet structure with long weir lengths will provide for larger discharges to occur with relatively low heads. If the clearing and snagging and the Type C drop structure were the only elements planned in the floodwater retarding structure, the Type C drop structure would rapidly become submerged and all of its flood retention effects would be eliminated. The function of the Type C drop structure as planned will be to control the lake's discharges from its crest elevation at 173.5 feet msl to an elevation of 174.1 feet msl or flood discharges ranging from 0 cfs to about 1,000 cfs.

The function of the bridge box inlet structure as planned will be to control the discharge of Lake Winnecook from an elevation of 174.1 feet msl to 176.0 feet msl or flood discharges ranging from 1,000 cfs to about 3,600 cfs. The channel starts controlling the bridge box inlet structure at a discharge of 1,150 cfs and ultimately controls the Type C drop structure at elevations above 176.0 feet msl or discharges greater than 3,600 cfs. Prairie Road will remain at its present elevation to assure proper lake level control since it acts as a weir and is an integral part of the bridge box inlet structure.

The interaction of the lake outlet structures has the effect of increasing the discharges of Lake Winnecook over present conditions for all events less than the 1-year storm. The system, as planned, will improve lake outlet conditions for lower stages to save storage for high volumes of flow. The peak discharges downstream from the channel improvement will be more than presently experienced for all events smaller than the 1-year storm and less for all greater storms. The table below shows an array of peak discharges at the present lake outlet and at the proposed channel outlet for both present and future conditions.

Frequency	Lake Outlet			Channel Outlet		
	Discharge (cfs)		% change	Discharge (cfs)		% change
	Present	Future		Present	Future	
1 year	1200	1200	0	1220	1220	0
5 year	3360	2780	17.3	3500	2800	20
10 year	4340	3600	17.1	4500	3650	18.9
25 year	5600	4726	15.6	5825	4896	15.9
100 year	7800	6600	15.4	8080	6833	15.4

The floodwater retarding structure will control 129.7 sq. mi. of drainage area and provide temporary flood storage for 1.7 inches of runoff or 11,700 acre feet. The estimated sediment inflow of 1,000 ac. ft. over the next 100 years, can be stored in the lake without serious impairment of its capacity. The Type C drop structure and box inlet drop structure will, in operational sequence series, serve as principal and emergency spillway for the lake.

The design of the drop structures and channel improvement will enable passage of the 100-year flood with lake stages below significant damageable values around the perimeter of the lake, and provide the desired level of protection downstream. The design elevations of the bridge and capacity provided in the structural system will allow passage of the freeboard hydrograph below the floor of the bridge on Prairie Road. The Type C drop structure will stabilize the lake level and prevent the stream from degrading below the lake's lowest natural outlet.

A review of the National Register of Historic Places and interviews with local residents indicated that no known archaeological or historical values will be affected. A review of the project by Mr. James H. Mundy, Maine State Historic Preservation Officer, indicated that the project will have no impact upon any structure or sites listed in the National Register of Historic Places or eligible for such designation. A survey of the local area by Dr. David Sanger, University of Maine Anthropologist, revealed no archaeological sites. Should discoveries be made during construction, work will be stopped and appropriate authorities will be notified. Work will not resume until the discovery has been examined by competent authorities, arrangements satisfactory to the sponsors, the Service and the authorities have been made, and the agreed-to-actions implemented.

Nonstructural Measures

Included in the nonstructural phase of this plan are land use planning and flood plain management. As a result of the completed soil survey, and production of flood plain delineation maps, the towns will have the basic tools necessary to establish land use regulations in the watershed. The towns currently are responsible for the approval of all new developments adjacent to all classified bodies of water in accordance with the mandatory Shoreland Zoning Law as adopted by the State of Maine Legislature. The Shoreland Zoning Law requires that the towns must zone all land within 250 feet of normal high water mark on all classified bodies of water. In addition, the towns will ensure that all developments are in accordance with the State of Maine Plumbing Code, which specifies the type, location, and conditions for installation of septic systems.

Land Use Changes

The relocation and enlargement of the channel will require about 10 acres of Type 7 wetland and the placement of the drop structure will require about one acre of Type 7 wetland.

As a result of the project, it is estimated that approximately 40 acres of forest land around Lake Winnecook, currently available for wood production and wildlife habitat, will be lost by the future use of the area for cottage development.

EXPLANATION OF INSTALLATION COSTS

The costs for application and technical assistance in the land treatment phase are based upon recent experiences of those involved in installation of these measures. The costs for applying the land treatment are estimated to be \$747,700 and will be furnished by landowners and operators from their own resources, or with cost sharing assistance available under ongoing conservation programs at the time of installation. Costs are shown in more detail in Table 1.

The value of technical assistance to be provided from PL-566 funds for accelerating the application of land treatment is estimated to be \$266,200. The Soil Conservation Service will use \$255,000 for technical assistance and the U. S. Forest Service will use \$11,200 through cooperation with the Maine Bureau of Forestry. The value of technical assistance to be furnished from ongoing conservation programs of the Soil Conservation Service and the Maine Bureau of Forestry, in cooperation with the U. S. Forest Service, is estimated to be \$9,600 and \$6,000 respectively.

The engineer's estimated cost for structural measures was based upon bid item prices for similar work in other watersheds adjusted to 1973 prices. A contingency allowance of 20 percent was added to the engineer's estimate.

Engineering services include surveys, geologic investigations, design, and preparation of plans and specifications. Additional geologic investigations will consist of back hoe pits, drilling, laboratory analyses, and testing of samples. Engineering services costs for structures usually range from 10 to 25 percent of estimated construction costs. Their estimated cost is \$71,000.

Landrights costs for all structural measures, obtained by consultation with sponsors, must be borne by the sponsor without federal cost sharing. They are estimated to be \$5,000.

The Type C drop structure, 1,500 feet of channel clearing and snagging, and 9,500 feet of channel realignment and enlargement, including dikes in old channel meanders, creation of pools and riffles, and placing, shaping, and seeding the spoil, all serve the purpose of flood prevention. The construction and engineering costs for these improvements will be borne totally by PL-566 funds. This amounts to \$640,000 for construction and \$56,000 for engineering.

The preliminary design and cost estimate for the combination box inlet drop structure, including the road approaches and bridge, was prepared jointly by the Service and the Maine Department of Transportation. A design was prepared for the box inlet drop structure alone, and for the same structure including the bridge. The estimated construction cost of the drop structure, for the purpose of flood prevention alone, will be borne totally from PL-566 funds. This will be \$95,000. The added cost for the bridge and road approaches is classified as a nonproject cost and will be borne totally by other than PL-566 funds. This construction cost will be \$36,000.

From a practical standpoint, the combination structure including road approaches should be installed in the same construction contract. Therefore, the total cost for the combination structure is included in Table 2 and the agreement. The construction cost of the combination structure including road approaches will be shared 72.5 percent from PL-566 funds and 27.5 percent from other than PL-566 funds. The Soil Conservation Service will provide all engineering services associated with project features, while the local sponsors will bear the engineering cost for the engineering services on nonproject items. This amounts to \$15,000 and \$10,000 respectively. The Soil Conservation Service will be responsible for the flood prevention portion of the design and the Maine Department of Transportation will be responsible for the design features of the bridge deck and road approaches.

Project administration costs, based upon experience in installation of similar measures, are estimated to be \$56,000; with \$50,000 from PL-566 and \$6,000 from other funds. The sponsors and the Service will each furnish the administrative services which they require, and each will pay the costs which it incurs for those services. These services include contract administration, relocation assistance advisory services, administrative functions connected with relocation payments, review of engineering plans, government representatives, and necessary inspection service during construction to insure that structural measures are installed in accordance with the plans and specifications.

The estimated schedule for expenditure of funds for both land treatment and structural measures is as follows:

Fiscal Year	Measure	PL-566 Funds	Other Funds	Total
First	Type C Drop Structure	\$ 55,000	\$ 3,000	\$ 58,000
	Land Treatment	53,250	96,300	149,550
Second	Site 1 - Box Inlet Drop Structure	120,000	3,000	123,000
	Land Treatment	53,250	96,300	149,550
Third	Channel Enlargement	330,000	2,500	332,500
	Land Treatment	53,250	96,300	149,550
Fourth	Channel Enlargement	330,000	1,500	331,500
	Land Treatment	53,250	96,300	149,550
Fifth	Clearing and Snagging	21,000	1,000	22,000
	Land Treatment	53,200	96,300	149,500
	TOTAL	\$1,122,200	\$492,500	\$1,614,700

The installation costs shown in Tables 1 and 2 include all costs to be incurred.

EFFECTS OF WORKS OF IMPROVEMENT

Conservation Land Treatment

Land treatment measures will adequately treat 2,282 acres of cropland, 7,842 acres of grassland, and 17,200 acres of forestland, totaling 27,324 acres within the watershed. Average annual soil loss will be reduced to three tons from nine tons per acre on cropland, to one-quarter ton from one ton per year on grassland, and to one ton from three tons per acre on forestland. The average annual sediment yield at the mouth of the watershed will be reduced to 10,000 tons from 29,000 tons. Sediment concentrations will be reduced to an annual average of less than 100 mg/l.

Storm runoff will be retarded by an estimated two percent. Highway maintenance costs will be lessened by reducing sedimentation into drains and ditches. The hydrologic condition of forestland will be improved. Increased agricultural and forestland production and quality will result. Wildlife habitat management will be carried out on more than 500 acres.

Over 100 farm units and 80 non-farm units will receive assistance on land treatment measures through the project.

Structural Measures

Three evaluation reaches were used to describe changes in flood stages, discharges, and acres flooded.

Around Lake Winnecook (Reach T-1) the project will reduce 100-year level flood stages by 2.5 feet. The area flooded by the 100-year evaluation storm will be reduced from approximately 1000 acres to 600 acres, or a 400-acre reduction. Reach T-1 will receive 100-year level flood protection to agricultural land and 157 lake front cottages and property, and 50-year level flood protection to roads and bridges. Six lake front cottages will not receive 100-year level protection and will have a two to six percent yearly chance of receiving first floor damages.

From Prairie Road to the ledge restriction in the Twentyfive Mile Stream channel (Reach T-2), discharges will be reduced from 7,900 to 6,600 cubic feet per second, and flood stages will be reduced 5.2 feet for the 100-year evaluation storm. This reach will receive 100-year level protection to agricultural land. Route 139 will flood from storms having a recurrence interval greater than 100 years.

Below the ledge restriction to the mouth of the watershed (Reach T-3), discharges will be reduced from 8,100 to 6,800 cubic feet per second and stages will be reduced by 0.6 feet for the 100-year evaluation storm. This reach will receive 30-year level protection to roads and bridges and 5-year level protection to agricultural land.

The 1954 flood was rated as having a 5-year recurrence interval. The project will give all presently flooded areas at least a 5-year level of protection. Larger storms will flood some agricultural lands.

Channel design is presently in the preliminary stage. Considerable latitude exists for incorporation of features which will lessen the impact of the project on the environment.

Project action will directly affect about 3.3 miles of the Twentyfive Mile Stream channel, from the confluence of Twentyfive Mile and Sandy Streams to the downstream limit of construction. Overall, 2.6 miles of natural stream channel will be replaced or altered with a 1.8 mile reach of man-made channel.

Selective intermittent clearing and snagging will be done at seven locations affecting 1,500 feet of the 3,400 feet of channel between Lake Winnecook and Prairie Road. A reduction of cover and resting places for fish, waterfowl, and other wildlife will result from the removal of obstructions which reduce the flow characteristics of the channel.

Downstream from Prairie Road, 9,500 feet of a combination of new and enlarged channel will be constructed. About 5,900 feet of natural channel will be cut off and replaced with about 2,700 feet of new man-made channel. All cutoff meanders will be diked on the upstream side and blocked on the downstream side to retain about 10 acres of water, thus creating Type 5 wetland. The habitat in the cutoffs will be changed from a flowing water regime to one of shallow ponded water, resulting in a reduction of fisheries habitat. However, the cutoffs should provide very favorable habitat for furbearers, especially mink, muskrat, and beaver, and waterfowl, particularly black and wood ducks.

The channel bottom will be cut into rock at six locations along the channel. A one-foot layer of broken rocks will be left in the channel bottom as fish spawning and nursery area. It is expected that this area of about 35,000 square yards will serve to replace that lost to the fisheries resources of Twentyfive Mile Stream. Excess rock excavation will be used for rip-rap to prevent undercutting and ensure stable side slopes where the channel is cut through silt and sand. The gravelly pockets between the rock cuts will be excavated about two to four feet below grade to serve as pools for fish.

The appearance of the channel area will be changed from a slow-moving meandering stream with heavily vegetated banks, to one showing the effects of widening and straightening. As much as practicable the south side of the channel will be maintained in its natural state, with the large trees left for shade; spoil will be placed on the north side. The channel travelway, banks, and spoil disposal areas will be planted with wildlife foodbearing and cover-providing shrubs, legumes, and grasses. Leveled and seeded spoil piles will create openings through the existing vegetation which can be utilized by deer, grouse, hare, woodcock, and ducks. This will diversify the habitat and increase the carrying capacities for various game and non-game species.

During construction there will be a loss of fish and wildlife in the immediate area of the channel. Erosion and sedimentation will be accelerated during construction. Excavation of 2,700 feet of new channel will produce an estimated 100 tons of sediment. Widening and deepening of 6,800 feet of existing natural channel will produce an estimated 8,000 tons of sediment. Short-term sediment concentrations could reach 1,000 ppm. The channel construction will be performed in such a way as to keep downstream sedimentation to a minimum.

Currently, a biological study consisting of sampling the benthic invertebrate community is underway. Organisms such as mayflies, caddisflies, stoneflies, scuds, worms, snails, etc., have typical clean water assemblages and are very sensitive to water quality changes. These invertebrates will provide information on what, if any, disruption the construction caused, how fast the stream recovered, and if construction improved or hurt the stream habitat. This phase of the study will determine the baseline conditions by collecting bimonthly the organisms from above, within, and below the proposed construction area.

The following acreages of Type 7 wetland will be lost to: new channel excavation, 7.1 acres; widening of existing channel, 3 acres; and the Type C drop structure, 1 acre. The small areas committed to construction will have no effect upon the availability of any mineral resources.

Access along the stream for recreational use will be improved through the installation of a maintenance road. Recreational boating in the new channel will be restricted by the drop structures and shallower water. Boat launching will be permitted by the Town of Unity, if demand arises, from the drop structure maintenance road.

About 800 acres of wetlands of low value to nesting waterfowl^{1/} (Types 2, 5, 6, and 7) will be affected by the project. Four areas are involved as follows:

- 1) One hundred acres of hayland can be classified as Type 2 wetland without the project, which will eliminate periodic flooding on 75 acres of this land from anything less than the 100-year flood. There are less than 12,500 acres of Type 2 in Maine.
- 2) About 280 acres can be classified as a mixture of Types 6 and 7 wetland. Project measures will benefit the area by preventing the wide and frequent variations in water level now experienced. There are approximately 170,000 acres of Types 6 and 7 in Maine.
- 3) The same situation exists on 120 acres of Type 5 wetland located at the northern end of Lake Winnecook. Maine has less than 2,500 acres of this type.

^{1/} Manual for Maine's Wetlands Inventory, Me. Dept. Inland Fisheries and Game, Dec. 1972.

- 4) The project will prevent flooding of 300 acres of Type 7 wetland located downstream from Prairie Road from anything less than a five-year frequency flooded. There are about 150,000 acres of type 7 in Maine.

Ground water levels in this area will be lowered about one foot. Spruce and fir may invade the area, but basically the woodlands will not be altered.

A diverse terrestrial ecosystem will be encouraged in the woodland areas adjacent to and between Sandy Stream and Twentyfive Mile Stream as a result of reducing the frequency and duration of flooding. Flooding is a limiting factor in the establishment and growth of many terrestrial plants. More plants will be established and the area will be more productive because of improved site conditions. More plant, seed and fruit production and better growth will create a diverse and productive wildlife habitat.

The project will also affect 2,230 acre Lake Winnecook. Lake levels will continue to fluctuate but the range will be reduced to 4.8 feet from 7.3 feet.

The structural measures will provide flood protection to about 1,700 acres. Agricultural damages will be reduced by an estimated 90 percent and non-agricultural damages by 95 percent. The local sponsoring organization will publicize, at least once annually, the nature and extent of the hazards remaining in the areas subject to flooding by the 100-year event.

Land use in the flood plain includes agricultural land, lake-front cottages, roads and bridges, and forestland. The major crops are corn for silage and hay. Land use will not change on the agricultural land; however, approximately 40 acres of forest land around Lake Winnecook, currently available for wood production and wildlife habitat is expected to be lost by the future use of the area for cottage development.

Sediment produced during cottage construction would enter Lake Winnecook. Erosion rates could increase to ten tons per acre per year from one-half ton. Conservation practices installed after development could return the rate to present levels. Unless closely regulated this development could be detrimental to the lake's water quality. This will reduce the amount of shoreline exposed to wave erosion during flooding. Submerged aquatic plants will grow more abundantly along the shoreline, providing more waterfowl feed and food and cover for fish.

As previously mentioned, the reduced water level fluctuation will also affect the wetlands at the northern and southern ends of the Lake. More stable water levels will provide better nesting conditions for waterfowl and provide better conditions for shoreline and marsh-spawning fish. Exposure of these areas in the past has led to destruction of eggs deposited during periods of spring high water.

Nonstructural Measures

The towns are responsible for the approval of all new development adjacent to Lake Winnecook and Twentyfive Mile Stream, as well as other classified bodies of water, in accordance with the mandatory Shoreland Zoning Law as adopted by the State of Maine Legislature. In addition, the towns will ensure that all developments are in accordance with the State of Maine Plumbing Code.

The results of the completed soil survey, in conjunction with a floodplain delineation map, will give the sponsors further information for use in regulating land use within the watershed and preventing development within the 100-year floodplain.

Economic and Social

Future development around the lake and the increase in property values resulting from a decrease in flooding would expand the tax base. Without project measures, only about 10 cottages could be developed on suitable sites. With the project measures land use changes which would create an estimated increase in land values of \$205,000 and tax base of one million dollars are anticipated.

Land treatment directly affects the economic base of the agricultural economy. An improvement in this base should result in financial gain to agricultural operators as well as increased employment. The effect will at least help maintain the population and maintain the aspect of a rural setting. Per capita income will rise as a result of project installation.

The land treatment measures and professional assistance by conservation technicians will lead to development of supplemental farm enterprises, such as recreation. The improved economy and the decrease of flood danger will lead to improvement in the quality of living for the people in the watershed.

Rural area development will be enhanced by a better managed agricultural base, reduced flood losses, improved land use planning, and improved recreational opportunities. The attractiveness of country living will be enhanced. Tourism and recreational traffic will increase. New business and additional development will increase the cost of town services to the area.

The project will serve as an example of sound conservation practices on agricultural land, proper land use planning in the developed areas, and how cooperation of communities and various levels of government can result in benefits from management of land and water resources.

An estimated 100 man-years of employment valued at one million dollars will result from installation of the project. Funds spent in the area will have a positive local economic effect.

The project will help protect the health and welfare of property owners by reducing the incidence and degree of well and spring contamination from flooded private sewage disposal systems. This will also improve the water quality and reduce eutrophication of Lake Winnecook by reducing the introduction of nutrients. The decrease in flooding will permit greater trafficability, access, and safety on roads presently inundated.

During installation of project measures traffic density, noise, road deterioration, and dust will be increased by construction vehicles.

Funds, energy, material, and labor spent on this project will not be available for use in other areas and on other projects.

There are no known historical, architectural, archaeological, or cultural values that will be affected by the project. The National Reservoir Salvage Act - Public Law 86-523, the National Historic Preservation Act - Public Law 89-665, and related acts will be adhered to.

PROJECT BENEFITS

The land treatment and structural measures will reduce the estimated average annual monetary floodwater damage from \$63,550 to \$3,050, a reduction of \$60,500 (95 percent). Approximately 99.5 percent (60,250) of the reduction in average annual floodwater damage will result from the system of structural measures, with the remaining 0.5 percent (\$250) resulting from land treatment measures. Indirect benefits attributable to the project were estimated to be \$9,600. Benefits from changed land use (urban), based on the increased land values from camp and cottage development were estimated to be \$8,100.

Redevelopment benefits were estimated to be \$13,500 annually. These benefits were based on the expected job opportunities to be created for underemployed local labor during the installation and operation and maintenance of project works of improvement.

Secondary benefits were estimated to be \$6,050 annually. These benefits were based on local secondary benefits stemming from the project such as the transportation, processing, and marketing of these goods and services that produce the primary benefits. Secondary benefits from a national viewpoint were not considered pertinent to the economic evaluation and were not evaluated.

Although not evaluated in monetary terms, it is expected that increased economic opportunities for low-income families, improved overall economic climate of the area, and a stimulus for sound resource planning and development in the watershed area will be provided by the project. In addition, other unevaluated benefits are expected to follow the installation of works of improvement and include values such as a greater sense of security, a diminishing hazard to life from floods, and increase aesthetic values.

COMPARISON OF BENEFITS AND COSTS

The total average annual benefits, including secondary benefits are \$97,500. The estimated average annual costs are \$60,800. The benefit-cost ratio is 1.6:1.0. The ratio of average annual primary benefits (\$91,450), without the inclusion of local secondary benefits, to estimated annual costs (\$60,800) is 1.5:1.0. Table 6 shows a comparison of annual benefits and costs.

PROJECT INSTALLATION

The land treatment and structural measures proposed in this plan are to be installed during a five-year installation period. The land treatment and structural measures will be installed fairly uniformly over the installation period. The structural measures are planned to be installed as follows: first year, Type C drop structure; second year, box inlet drop structure, Site No. 1; third and fourth years, channel realignment and enlargement; and fifty year, intermittent clearing and snagging.

Federal assistance for carrying out the works of improvement as described in the work plan will be provided under the authorities of Public Law 566, as amended.

Land treatment measures will be installed by the landowners, operators, or managers with their own funds and cost share assistance from RECP or other similar programs which are available. On private land, the Soil and Water Conservation District in cooperation with the Soil Conservation Service, and the Maine Bureau of Forestry, assisted by the U. S. Forest Service, will furnish technical assistance for installation of the land treatment measures. The State of Maine and local municipalities will install the land treatment measures on their holdings. Provisions for carrying out the accelerated program will be included in the annual plans of the Soil and Water Conservation District Boards of Supervisors.

The Soil Conservation Service will furnish engineering services for layout and design, prepare plans and specifications, and will also provide a government representative, inspection services, and other project administration services which it requires. With respect to inspection, the Service will provide construction inspection for all features of the structural works of improvement on which PL-566 funds are spent. It will also inspect all other features where malfunction or failure could adversely affect stability or functioning of those features on which PL-566 funds are spent.

The sponsors will use funds other than PL-566 to secure all landrights necessary for the project, furnish engineering and technical assistance in connection with the bridge and road approaches, provide the nonproject costs, administer construction contracts and provide other project administration services which they require. With respect to inspection services, the sponsors will, without PL-566 cost sharing, provide such inspection services as they deem necessary for the bridge and road approaches and to ensure proper functioning of the project. The Maine Department of Transportation will furnish engineering assistance for design and construction of Site No. 1 as it concerns the bridge and road. The Maine Department of Inland Fisheries and Game will furnish assistance to coordinate all aspects of construction and project implementation as they relate to fish and wildlife resources. The Waldo County Soil and Water Conservation District will be responsible for the following:

1. Assume local responsibilities in coordinating the activities of the various cooperating agencies in order to use all available resources to carry out the plan.
2. Take the leadership in developing an accelerated program of land treatment for the watershed.
3. Render assistance to the town of Unity in obtaining landrights.
4. Provide the necessary legal, administrative and clerical personnel, facilities, supplies and equipment to advertise, award and administer contracts on all structural works of improvement at an estimated cost of \$6,000.

The town of Unity will be responsible for the following:

1. Acquire by purchase or other means, landrights for all structural measures on lands in the town of Unity. The cost is estimated to be \$5,000.
2. All nonproject costs associated with Site No. 1. This cost is estimated to be \$46,000.
3. Manage the land adjacent to Lake Winnecook to prevent any future development below elevation 180 feet mean sea level.

The town of Burnham will be responsible for managing the land adjacent to Lake Winnecook to prevent any future permanent development below elevation 180 feet mean sea level.

The town of Troy will be responsible for managing the land adjacent to Lake Winnecook to prevent any future permanent development below elevation 180 feet mean sea level.

Based on their knowledge of the landowners involved in each of the sites, the local sponsors do not anticipate any difficulty in obtaining all necessary landrights. The sponsors will exercise the power of eminent domain, where necessary, in securing landrights for land within their jurisdiction.

FINANCING PROJECT INSTALLATIONS

The Waldo County Soil and Water Conservation District will administer contracts on all works of improvement through the use of state appropriated funds made available through the Maine Soil and Water Conservation Commission.

Local tax revenue and expected donations will be used in the towns of Unity, Burnham, and Troy to finance the acquisition of landrights. The town of Unity has petitioned the Maine Department of Transportation for engineering and financial assistance on nonproject items associated with Site No. 1. The Department of Transportation has completed on-site surveys and preliminary cost estimates on the nonproject items. It stands ready to hold a public hearing as required by law, and to proceed with financial assistance as soon as this work plan is approved.

Public Law 566 funds will be used for structural measures during the installation period pursuant to the following conditions:

1. The sponsors have provided assurance to the State Conservationist in writing, that they have legal authority and sufficient funds and are willing and able to obtain all landrights for the structural works of improvement.
2. The contracting agency is prepared to discharge its responsibilities.
3. Project agreements and operation and maintenance agreements have been executed.

4. Public Law 566 funds are available.

The total installation cost of the structural works of improvement is estimated to be \$867,000 of which \$11,000 will be borne by other than Public Law 566 funds.

The total cost of installing land treatment measures is estimated to be \$747,700 of which \$465,900 is for installation and \$281,800 for technical assistance. It is expected that funds of the Rural Environmental Conservation Program for cost sharing will be available to qualified private landowners for installing eligible land treatment measures on their land. The technical assistance cost will be financed as \$266,200 PL-566 funds; \$9,600 PL-46 funds; \$2,100 Maine Bureau of Forestry funds; and \$3,900 Federal-State Cooperative Forest Management Program funds. The sharing of costs between PL-566 and all other sources of funds is shown in Table 1. The program income will be handled as stated in the project agreement as signed by the sponsoring local organizations and the Service.

The Sponsors will develop and maintain a financial management system which shall provide for:

1. Accurate, current, and complete disclosure of the financial results of the project in accordance with SCS reporting requirements. The Service requires reporting on an accrual basis and if the sponsor's accounting records are not kept on that basis, the sponsor will develop such information through an analysis of the documentation on hand or on the basis of best estimates.
2. Records which identify adequately the source and application of funds for PL-566 financially supported undertakings. These records shall contain information pertaining to grant awards and authorizations, obligations, unobligated balances, assets, liabilities, outlays, and income.
3. Effective control over and accountability for all funds, property, and other assets. The Sponsors shall adequately safeguard all such assets and shall assure that they are used solely for authorized purposes.
4. Comparison of actual with budgeted amounts for each undertaking, i.e., each project agreement, land rights agreement, agreement for services, and relocation agreement. Also, the relation of financial information with performance or productivity data, including the production of unit cost information whenever appropriate and required by the Service shall be provided.
5. Procedures to minimize the time elapsing between the transfer of funds from the U. S. Treasury and disbursement by the Sponsor, whenever the funds are advanced by the Service. When advances are

made by a letter of credit method, the sponsors shall make draw-downs from the U. S. Treasury through its commercial banks as close as possible to the time of making the disbursements.

6. Procedures for determining the allowability and allocability of costs in accordance with the Service obligating instrument (project agreement, agreement for services, land rights agreement, relocation agreement) and the Service Watershed Protection Handbook.
7. Accounting records which are supported by source documentation.
8. Audits to be made by the sponsors or at the sponsors direction, to determine, at a minimum, the fiscal integrity of financial transactions and reports, and the compliance with laws, regulations, and administrative requirements. The sponsors will schedule such audits with reasonable frequency, usually annually, but not less frequently than once every two years, considering the nature, size, and complexity of the activity.
9. A systematic method to assure timely and appropriate resolution of audit findings and recommendations.

PROVISIONS FOR OPERATION AND MAINTENANCE

Land Treatment

Land treatment measures will be maintained by landowners and operators where such measures are installed. These measures are provided for in the owner's or operator's conservation or forest land plan under agreement with the four local Soil and Water Conservation Districts and the Maine Bureau of Forestry. The State of Maine and the local municipalities will operate and maintain the measures installed on State and municipal forest lands.

Structural Measures

All structural measures will be operated and maintained by the Town of Unity. The Town of Unity has the legal authority under state law to operate and maintain works of improvement as proposed in this plan. Funds necessary will be appropriated from local tax revenues.

All structural works of improvement will be inspected at least annually and after every major storm or the occurrence of any unusual adverse conditions that affect their operation. Items of inspection of each structure will include, but not be limited to, the condition of the spillway and fences and gates installed as part of the structure. Items of inspection on the channel will include, but not be limited to: location of erosion; the condition of the vegetative cover and riprap; and the need for control of vegetation to prevent any reduction of the capacity of the channel by debris and sediment accumulation. The inspection will involve representatives of the Town of Unity, the Waldo County Soil and Water Conservation District, the Soil Conservation Service, and the Maine Department of Inland Fisheries and Game.

These inspections will continue for three years following the installation of works of improvement. Inspections after the third year will be made annually by the sponsors. They will prepare a report and send a copy to the Soil Conservation Service.

Maintenance work likely to be required consists of keeping the spillways free of trash, riprap on the channel work, and proper vegetation on the channel banks and spoil disposal (wildlife planting) areas. Operation and maintenance includes such major repair and replacements as are necessary to keep the project functioning as planned.

An establishment period of 3 years is provided for all structural works of improvement and associated vegetative cover. During this period, the Service may use PL-566 funds to cost-share on any repairs or other work resulting from unknown conditions or deficiencies. The cost of repairs will be shared in the same ratio as the original structure.

Repairs or additional work not eligible for PL-566 financial assistance include maintenance work and work resulting from improper operation and maintenance. However, the Soil Conservation Service will provide technical assistance that may be needed in performing any of these tasks.

The annual operation and maintenance cost for the structural measures is estimated to be \$1,100. This consists of \$800 for the channel, \$200 for the box inlet drop structure, and \$100 for the Type C drop structure.

Specific operation and maintenance agreements must be executed prior to the signing of the project agreement, which is the fund authorizing document for each contract. The operation and maintenance agreement is an agreement entered into by the Soil Conservation Service and those sponsors who assume full responsibility for providing adequate and sound arrangements for proper operation, timely inspection, and prompt and appropriate performance of needed maintenance. The operation and maintenance agreement will be referenced to the State Watersheds Operation and Maintenance Handbook, and an operation and maintenance plan will be prepared for each work of improvement. The operation and maintenance agreement will include specific provisions for retention and disposal of property acquired or improved with PL-566 financial assistance.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
TWENTYFIVE MILE STREAM WATERSHED, MAINE

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) 1/					
			PL-566 Funds			Other		
			Non-Fed. Land	Total	Non-Fed. Land SCS 3/	Total	Non-Fed. Land SCS 3/	Total
<u>LAND TREATMENT</u>								
Land Areas 2/	Acres to be treat- ed	2,282 7,842 17,200	2,282 7,842 17,200			115,000 332,500	115,000 332,500	115,000 332,500
Cropland						18,400	18,400	18,400
Grassland								
Forest Land								
Technical Assistance		27,324	255,000	11,200	266,200	9,600	6,000	15,600
TOTAL LAND TREATMENT	xxxx	xxxx	255,000	11,200	266,200	457,100	24,400	481,500
<u>STRUCTURAL MEASURES</u>								
Construction	No.	2	2	135,000 600,000	135,000 600,000			
Floodwater Retarding								
Structures								
Channel Work (N) 4/	Miles	2.08	2.08					
Subtotal -								
Construction								
Engineering Services								
Relocation Payments								
Project Administration								
Construction Inspec.								
Other								
Relocation Assistance								
Advisory Services								
Subtotal - Administration								
Other Costs								
Landrights								
Subtotal - Other								
TOTAL STRUCTURAL MEASURES								
TOTAL PROJECT		1,111,000	11,200	1,122,200	468,100	24,400	492,500	1,614,700

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1/ Price base 1974.
2/ Includes only areas estimated to be adequately treated during the project installation period. Treatment will be accelerated throughout the watershed, and dollar amounts apply to total land areas, not just to adequately treated areas.

3/ Federal agency responsible for assisting in installation of works of improvement.

4/ Type of channel before project: (N) - an unmodified, well-defined natural channel or stream; (M) - man-made ditch or previously modified channel; (O) - none or practically no defined channel.

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT
(At Time of Work Plan Preparation)

TWENTYFIVE MILE STREAM WATERSHED, MAINE

Measure	Unit	Applied To Date	Total Cost (Dollars) 1/
<u>LAND TREATMENT</u>			
<u>Soil Conservation Service</u>			
Contour Farming	Acres	225	2,250
Critical Area Planting	Acres	75	22,500
Crop Residue Management	Acres	670	4,600
Diversions	Feet	33,800	8,450
Drainage Field Ditch	Feet	41,250	20,625
Pond	Number	48	72,000
Grassed Waterway or Outlet	Acres	43	820
Land Smoothing	Acres	85	5,780
Pasture & Hayland Management	Acres	2,230	51,290
Pasture & Hayland Planting	Acres	515	15,450
Stream Channel Improvement	Feet	300	750
Stripcropping	Acres	150	1,500
Drain	Feet	14,965	7,480
Wildlife Habitat Management	Acres	275	7,700
Wildlife Wetland Management	Acres	650	2,930
<u>SCS Subtotal</u>	xxx	xxxxx	224,125
<u>Forest Service</u>			
Hydrologic Cultural Operations	Acres	1,750	24,740
Fire Control	Acres	73,344	73,000
Tree Planting	Acres	380	15,960
<u>FS Subtotal</u>	xxx	xxxxx	113,700
<u>TOTAL</u>	xxxx	xxxxx	337,825

1/ Price Base: 1974 Prices

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TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION
TWENTYFIVE MILE STREAM WATERSHED, MAINE

(Dollars) 1/

Item	Installation Cost PL-566 Funds			Installation Cost			Other Funds			Total Installation Cost
	Con- struction	Engi- neering	Total PL-566	Con- struction	Engi- neering	Land Rights	Total Other			
Site 1 - Box Inlet Drop Structure	95,000	15,000	110,000	36,000	2/	10,000	2/	2,500	2,500	112,500
Type C Drop Structure	40,000	5,000	45,000					500	500	45,500
Channel Enlargement (N) 3/	590,000	50,000	640,000					1,500	1,500	641,500
Clearing & Snagging (N) 3/	10,000	1,000	11,000					500	500	11,500
Subtotal	735,000	71,000	806,000					5,000	5,000	811,000
Project Administration	xxxx	xxxx	50,000	xxxx	xxxx	xxxx	xxxx	6,000	56,000	
GRAND TOTAL	735,000	71,000	856,000	-----	-----	-----	-----	5,000	11,000	867,000

1/ Price Base 1974.

2/ Non-Project Cost for Bridge Over Box Inlet Drop Structure - not carried in total column.
3/ Type of Channel Before Project: (N) - An unmodified, well-defined natural channel or stream.

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TABLE 3 - STRUCTURE DATA
 LAKE WINNECOOK FLOOD RETARDING STRUCTURE
 TWENTYFIVE MILE STREAM WATERSHED, MAINE

Item	Unit	Type C Drop Structure/Box Inlet Drop Structure
Class of Structure	---	b
Drainage Area	Sq. Mile	129.66
Curve No. (1 day AMC II)	---	71
Curve No. (2 day AMC II)	---	66
Tc	Hours	45
Elevation natural outlet and elevation crest of Type C drop structure (stabilized lake surface)	Feet (MSL)	173.5 1/
Elevation crest box inlet drop structure	Feet (MSL)	170.0 1/
Elevation crest Prairie Road Bridge	Feet (MSL)	180.0
Maximum difference in elevation between channel bottom and Prairie Road Bridge crest	Feet (MSL)	16.0
Volume of Concrete	Cu. Yds.	120 1/
Type C drop (weir-100 ft., crop-5.0 ft.)	Cu. Yds.	435 1/
Box inlet drop (weir-82 ft., width-42 ft. drop-6 ft.)		
Capacity		
100-year sediment accumulation (Submerged)	Ac. Ft.	1,000 2/
At natural outlet of lake	Ac. Ft.	40,000 3/
Between natural outlet and crest of Type C drop	Ac. Ft.	0
Retarding - during passage of 100-year flood	Ac. Ft.	11,700
Total above natural lake outlet	Ac. Ft.	11,700
Surface Area		
At crest of Type C drop structure	Acres	2,230
Retarding pool (during passage of 100-yr. flood)	Acres	3,100
Principal Spillway		
Rainfall volume (areal) (1 day)	Inches	5.95
Rainfall volume (areal) (10 day)	Inches	11.30
Runoff volume (areal) (10 day)	Inches	8.50
Maximum outflow 5/	cfs	5,780
Maximum water surface elevation	Feet (MSL)	177.82
Type (Type C & Box inlet drops in series)	---	Concrete 1/
Emergency Spillway		
Rainfall volume ESH 3/	Inches	8.31
Runoff volume ESH 3/	Inches	4.27
Type (Type C & Box inlet drops in series)	---	Concrete
Maximum water surface elevation	Feet (MSL)	178.34
Freeboard		
Rainfall volume F.H. 4/	Inches	12.15
Runoff volume F.H.	Inches	7.60
Maximum water surface elevation	Feet (MSL)	179.74
Capacity Equivalents		
Sediment volume	Inches	0.15
Retarding volume	Inches	1.69

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1/ A Type C drop structure and a box inlet drop structure in series serve as principal and emergency spillways for the lake.
 2/ Sediment inflow will be stored below normal lake surface.
 3/ Capacity of lake below natural outlet estimated.
 4/ Areal and duration correction made using Hydrometeorological Report No. 33.
 5/ The principal spillway design storm is different from the 100-year evaluation storm which was used to design the channel since it has a greater peak. The freeboard storm was used to design the principal spillway, thus the discharge values in Table 3 will not agree with those in Table 3A.

TABLE 3A - STRUCTURE DATA
 CHANNEL 2 /
 TWENTYFIVE MILE STREAM WATERSHED, MAINE

Freq.	Station	D.A. Sq. Mi.	Capacity cfs Req'd Design	Water Surface Elev.	D.C. 1/ Bottom Elev.	Channel Dimen.			"n" Value		Velocities		Excavation (1000 C.Y.)	
						Bottom Width (ft)	Depth (ft)	Side Slopes	As Built	Aged	As Built	Earth	Rock	
100	127+29	129.6	6600	6600	178.3	173.5	---	---	---	0.35	0.35			
100	156+93	129.7	6600	6600	178.3	173.5	---	---	---	0.35	0.35			
100	161+24	129.7	6600	6600	178.3	170.0	---	---	---	0.35	0.35			
100	161+64	129.7	6600	6600	176.3	164.0	100	10.2	---	4.12	4.95	51.3	12.4	
100	179+78	129.8	6600	6600	175.6	163.3	100	12.3	1:1	.030	.025	4.42	5.30	
100	202+24	130.7	6650	6650	174.8	162.8	100	11.5	1:1	.030	.025	3.22	3.86	
5	222+40	131.8	2800	2800	170.6	162.4	100	9.4	1:1	.030	.025	3.77	4.53	
100	222+40	131.8	6650	6650	174.0	162.4	100	9.4	1:1	.030	.025	3.34	4.00	
5	230+95	132.2	2800	2800	170.6	162.4	100	7.1	1:1	.030	.025	1.50	1.80	
100	230+95	132.2	6683	6700	174.0	162.4	100	7.1	1:1	.030	.025	2.12	2.54	
5	245+95	136.3	2800	2800	170.5	159.7	100	9.3	1:1	.030	.025	1.76	2.11	
100	245+95	136.3	6833	6850	173.7	159.7	100	9.3	1:1	.030	.025	2.49	2.98	
5	256+35	136.4	2800	2800	170.4	158.0	100	12.1	1:1	.030	.025	2.06	2.47	
100	256+35	136.4	6833	6850	173.6	158.0	100	12.1	1:1	.030	.025	2.91	3.49	

1/ D. C.. - Design Channel

2/ Stations and elevations are same as plotted on with-project portion of condensed profile in Section II
 of the work plan.

3/ Crest of Weir

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TABLE 3B - STRUCTURE DATA
CHANNEL CLASSIFICATION
TWENTYFIVE MILE STREAM WATERSHED, MAINE

Station or Reach	Type of Work <u>1/</u>	Before Project	
		Type of Channel <u>2/</u>	Flow Condition <u>3/</u>
127+29			
156+93	IV Type C Drop Structure	N	Pr
161+24	IV	N	Pr
161+64	Bridge & Box Inlet Drop Structure		
179+78	II	N	Pr
202+24	II	N	Pr
222+40	II	N	Pr
230+95	II	N	Pr
245+95	II	N	Pr
256+35	II	N	Pr

1/ I. - Establishment of new channel including necessary stabilization measures.
 II. - Enlargement or realignment of existing channel or stream.
 III. - Cleaning out natural or man-made channel (includes bar removal and major clearing and snagging operation).
 IV. - Clearing and removal of loose debris within channel section.
 V. - Stabilization as primary purpose (by continuous treatment or localized problem areas - present capacity adequate).

2/ N - An unmodified well-defined natural channel or stream.

3/ Pr - Perennial - flows at all times except during extreme drought.

TABLE 4 ANNUAL COST
TWENTYFIVE MILE STREAM WATERSHED, MAINE
(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost <u>2/</u>	Operation and Maintenance Cost	TOTAL
Total Project	55,840	1,100	56,940
Project Administration	3,860	xxx	3,860
GRAND TOTAL	59,700	1,100 <u>3/</u>	60,800

1/ Price base: 1974.

2/ 100 years @ 6 7/8 percent interest.

3/ Includes \$400 for operation, maintenance, and replacement for the fish and wildlife measures.

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TABLE 5 ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS
TWENTYFIVE MILE STREAM WATERSHED, MAINE
(Dollars) 1/

Item	Estimated Average Annual Damage		Damage Reduction Benefit
	Without Project	With Project	
Floodwater Crop and Pasture	500	50	450
Non agricultural Camp and Cottage	50,950	2,030	48,920
Road and Bridge	12,100	970	11,130
Subtotal	63,550	3,050	60,500
Indirect	10,100	500	9,600
Total	73,650	3,550	70,100

1/ Price Base: 1974.

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TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES
TWENTYFIVE MILE STREAM WATERSHED, MAINE

Evaluation Unit	AVERAGE ANNUAL BENEFITS 1/			Secondary	Total	Avg. 3/ Annual Cost	Benefit- Cost Ratio
	Damage Reduction	Changed Land Use	Redevelopment				
Total Project	69,850	8,100	13,500	6,050	97,500	56,940	1.7:1.0
Project Administration	xxx	xxx	xxx	xxx	xxx	3,860	xxx
GRAND TOTAL	69,850 2/	8,100	13,500	6,050	97,500	60,800	1.6:1.0

1/ Price base: 1974.

2/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$250 annually.

3/ From Table 4.

December 1975

INVESTIGATIONS AND ANALYSES

Economics

Three evaluation reaches were used for making the economic studies. Floodwater damages and benefits were computed using the frequency method of analysis as described in Chapter III of the SCS Economics Guide for Watershed Protection and Flood Prevention.

Camp and cottage and recreational damage was obtained by interviewing floodplain property owners and the use of standard data in TSC-Technical Note Watersheds - UD-19. Agricultural damages were obtained by interviewing farmers with land in the flood plain and by using data in TSC-Technical Note-Watersheds - UD-16. Estimates of damages to roads and bridges were obtained from town officials and the Maine Department of Transportation.

Damages were related primarily to the 100-year frequency storm and computed "with" and "without" the project. Damages from the floods of September 1954 and November 1966 were used as a basis for developing the stage-damage data when available. Damages were computed for floods up to and including the 100-year frequency event. The reduction of damages created by project measures was considered to be the damage reduction benefit (Table 5).

Indirect damages were estimated to be 15 percent of direct damages for camp and cottage and recreational property, 20 percent of damages to roads and bridges, and 10 percent of direct damages for agricultural land.

Crop and pasture damages were converted to adjusted normalized prices based on "Interim Price Standards for Planning and Evaluating Water and Land Resources," Water Resources Council, April 1966. Current prices were used for all other values.

Benefits from changed land use were based on the estimated increase in land values from the development of additional camps and cottages around Lake Winnecook.

Redevelopment benefits were based on the use of unemployed local labor to be employed during project installation and operation and maintenance. Local labor employed was estimated to be 25 percent of construction costs and 50 percent of operation and maintenance costs. Benefits from employment of local labor in operation and maintenance were limited to a 20-year period.

Secondary benefits were estimated to be 10 percent of direct project benefits. All secondary benefits are local in nature and were not considered pertinent from a national viewpoint.

Installation costs of structural measures were amortized at 6 7/8 percent interest for the 100-year life of the project. Installation and operation and maintenance costs were based on 1974 prices.

Hydrology and Hydraulics

General: The hydraulics and hydrologic analysis followed standard procedures of the Soil Conservation Service National Engineering Handbooks and other technical references as indicated in this summary.

Basic Data; Precipitation records, as published in the Climatological Data by the U. S. Department of Commerce, are available for stations at Skowhegan, Orono, and Augusta. Daily precipitation totals are available for Unity. No stream gage data is available for Twentyfive Mile Stream or the immediate area.

Watershed Analysis: A study of the hydrologic and hydraulic conditions of the watershed was made considering such factors as geology, land use, soils, topography, stream channel characteristics, potential floodwater retarding structure locations, and floodwater damage locations. During this study, the watershed was divided into 16 hydrologic sub-areas for evaluation. Hydrologic soil groups were delineated on maps prepared by soil scientists of the Soil Conservation Service.

Runoff curve numbers for forest land, under present and future conditions, were determined by the U. S. Forest Service based on Soil Conservation Service soil classification and on a study of forest cover conditions in the watershed. Land use and treatment classes for "without" and "with" project conditions were prepared by the Watershed Planning Staff with the assistance of the District Conservationist and the soil scientist. Runoff curve numbers were computed from this data for land use areas other than forest as outlined in Chapter 9, Soil Conservation Service National Engineering Handbook, Section 4, Hydrology. Composite runoff curve numbers were then computed for each sub-area. Time of concentration for each sub-area was computed either by the CFS-Hrs method or by stream channel hydraulics and overland flows, as outlined in Chapter 15 of SCS National Engineering Handbook. The times of concentration were also computed using the SCS Engineering Standard Drawing ES-1015. Travel time for each reach was computed using Manning's formula.

Channel and valley, dam, or bridge and road cross sections were surveyed at 46 selected locations.

Evaluation Series: The 25- and 100-year frequency synthetic storms were used to obtain runoff frequency estimates.

Rainfall for the 1-day and 10-day duration storms for these frequencies was determined from U. S. Department of Commerce, Weather Bureau Technical Papers No. 40 and 49.

Hydrographs for all sub-areas were developed and valley flood routed for each storm by using the Soil Conservation Service Principal Spillway Routing computer programs. The composite hydrographs were then routed through Lake Winnecook by the storage-indication method as outlined in

Chapter 17 of Section 4, SCS National Engineering Handbook, at summertime lake level plus the stage required to pass one-half of the quick return flow.

Discharge-frequency curves were plotted on logarithmic-normal paper at all reaches studied for both "without" and "with" project conditions.

Rating Curves: Rating curves, showing the relationship between stage and discharge, were developed at strategic locations throughout the damage reaches. Water surface profiles for both "without" and "with" project conditions were computed through the damage reaches using the T.S.C. 1130 computer program for water surface profiles, and by using TR-15 "Computation of Water Surface Profiles and Related Parameters by ES-Charts" for the channel enlargement reaches.

Stream profiles were plotted for the major reaches on a profile sheet (see Appendix C). The profiles were plotted in two parts with one showing "without" project conditions and one showing "with" project conditions. These are referenced to each other by cross section numbers. Also plotted on the profiles are the channel bottom elevations, start of damage, low bank, bridge and road data, first floor of critical properties, flood highwater marks, and the 100-year and 5-year "without" and "with" project condition flood profiles. A plan sheet (see Appendix B) showing the major reaches is an enlargement of aerial photographs showing cross section locations, the channel enlargement centerline, the 100-year and 5-year frequency floodplain limits for both "without" and "with" project conditions, and the structure locations.

Structural Design Criteria: The principal spillway hydrograph routing was accomplished by routing the composite hydrograph through the bridge box inlet structure by the storage-indication method. Stage-discharge curves for the floodwater retarding structure were determined by the water surface profiles computer program. Drawdown for Lake Winnebago was computed in accordance with TSC Advisory ENG-UD-17. The structures were proportioned by trial and error methods by using different size bridges, box inlets, drop structures, and channels. The most economical combination of works of improvement which would meet project objectives was selected from this data.

The rainfall used in development of the emergency spillway and freeboard hydrographs was obtained from Hydrometeorological Report No. 33. Hydrographs were developed for each sub-area and routed through the reaches and the structures in accordance with SCS Technical Release No. 20, "Computer Program for Project Formulation - Hydrology."

Channel Enlargement Design: The channel downstream from the bridge box inlet structure was designed in accordance with SCS Technical Release No. 25, "Planning and Design of Open Channels," to give the best exit hydraulic conditions to the bridge box inlet structure. This improvement consists of the removal of a ledge restriction, deepening and aligning the channel, and clearing and snagging the structure approach channel.

Engineering

Selection of the structural works of improvement for flood prevention was based on the findings of the economic, hydrologic, geologic, and fish and wildlife studies of existing conditions, and on the potential of alternative combinations of structural measures to effectively harmonize with, and be beneficial to, the environment.

Structure classification was based on the amount of storage retained in the site and the proximity of the site to its immediate damage center. All sites were reviewed by the SCS State Conservation Engineer. The box inlet drop structure has been planned as a Class "B" structure in accordance with SCS Engineering Memorandum 27 Criteria, and a grade stabilization structure has been planned as a Type C drop structure.

A base map of the watershed was prepared to show the watershed boundaries, the drainage pattern, road systems, and other watershed features. A field reconnaissance was made of all potential floodwater retarding structure sites. This study resulted in the selection of a system consisting of a Type C drop structure on Twentyfive Mile Stream below Lake Winnecook, a bridge box inlet drop structure downstream at Prairie Road, about 9,500 feet of channel enlargement, and about 1,500 feet of channel clearing and snagging.

Detailed topographic maps were made of each site from either transit or plane table surveys, and all elevations are referenced to mean sea level datum. These maps were used for the location of physical features and to make a preliminary design and cost analysis of each measure. Fill and excavation volumes were based on surveys for each structural measure and were computed by the average end area method.

Fifteen-minute U.S.G.S. topographic maps were used to determine available flood storage on Lake Winnecook. A field reconnaissance was made on Twentyfive Mile Stream above Prairie Road to determine the type and extent of channel clearing and snagging required to meet project objectives.

Preliminary designs and cost estimates for the bridge were provided by the Maine Department of Transportation. All preliminary designs are in accordance with the Soil Conservation Service Engineering Memorandum SCS-27 (Rev.); Engineering Memorandum SCS-72; Section 4, Chapter 21 and Sections 11 and 14 of the National Engineering Handbook; U. S. Weather Bureau Technical Papers 40 and 49; Soil Conservation Service Technical Release No. 25; and recognized engineering references.

The physical dimensions of the works of improvement are shown in Tables 3 and 3A. Final design of all structural works of improvement will be submitted to applicable state regulatory agencies for concurrence.

Geology

General: The methods and detail of investigation in the Twentyfive Mile Stream Watershed follow guidelines as set forth in TR-17, "Geologic Investigations for Watershed Planning"; TR-25, "Planning and Design of Open Channels"; and "Standards for the Preparation and Assembly of Basic Geologic Data", Engineering and Watershed Planning Unit, Broomall, Pennsylvania.

Basic Data: A review was made of the geologic literature, maps, and general references to obtain information relating to the regional geology, rock types, rock structure, glacial deposits, local problems, and ground water conditions. Topographic maps and aerial photographs were studied in order to identify watershed conditions.

A field examination was made in all accessible portions of the watershed. Pertinent information was recorded on U.S.G.S. 15-minute quadrangle maps, and 1" = 500' plane table maps of the improvement area. Outcrops and road cuts were examined; streamflow, water table, and streambed conditions were observed; and general land use and water storage conditions were noted. Geologic features were located and used to establish geologic correlation in the watershed. Sediment and erosion damages were evaluated.

Geophysical methods (seismic refraction and electrical resistivity) were utilized for subsurface investigation of the channel improvement area. Hand auger and hand driven probes were also used.

Sediment and Erosion: A field examination was made of the frequently flooded agricultural lands for scouring and overwash damage. Auger holes were used to compare frequently and less frequently flooded soils. Very little difference was noted. The overwash material is very similar to the alluvial and lacustrine parent material. Damage by infertile overwash is minimal. Measurable scouring is not present. Streambanks are generally stable, heavily vegetated and show no signs of serious erosion.

There are some minor problems with eroding roadbanks and ditches, and some construction and urban areas that contribute a sediment load to the waterways. There does not appear to be any severe erosion or sedimentation problems.

Gross erosion and sedimentation quantities were computed by using survey data obtained in a similar watershed. The sediment from the streams concentrates in Lake Winnebago, and it is assumed that this material will be accommodated in "wet" storage in the lake.

Ground Water: The depth to the ground water table throughout the area immediately surrounding Twentyfive Mile Stream is very shallow, generally within three feet of the surface. Water movement through the soils is slow except for occasional layers of more permeable sand. The proposed channel modifications will lower the present stream water surface. This will have the effect of lowering the water table throughout the flood plain below the Prairie Road bridge.

The ground water conditions in the watershed vary widely from the eastern highlands to the western lowlands. The glacial outwash deposits provide the best opportunity for ground water sources; however, some successful low-yield wells have been developed in the glacial till and the bedrock. The fine-grained marine deposits generally are very poor water producers.

Site Investigations: The area of the proposed channel improvements is a flat, featureless, poorly drained area. The surface is covered with peat, muck, and organic topsoil. The ground water table is within three feet of the surface. Geologically, the area was the site of deposition of sands, silts, and clays in a marine estuarine environment. Shallow bedrock has prevented deep downcutting of the stream through the sediments. The deposits of sand and silt overlying the bedrock vary in thickness from several inches to more than 20 feet. The sand and silt are the major non-rock materials influencing conditions along the channel. Bedrock is a factor along at least 2,800 feet of the improvement area. The proposed grade is below the rock surface in this area.

The present channel is stable both vertically and laterally. The stream carries a sand-sized bedload. It appears that with adequate design consideration a stable, improved channel can be maintained.

The drop structure above the Prairie Road bridge is also located on deep sands and silts. There do not appear to be any severe problems relating to the construction of the Type C drop structure in this area. The structure at the bridge is located on a firm foundation as indicated by the preliminary geologic investigation. The preliminary earthquake hazard investigation included determining seismic risk by locating the watershed on B. F. Howell's "Average Cumulative Seismic Hazard Index Map" and Fox's "Seismic Regionalization Map." A study was made of regional geology for evidence of major active faulting or areas of crustal movement, and a study of proposed structure sites was made to identify critical materials or geologic conditions that pose earthquake hazards.

A detailed investigation will be made to further delineate site conditions and to determine final design parameters.

The following items were considered in the engineering evaluation and cost estimates:

1. Bedrock excavation along sections of the improvement section.
2. Special design measures to insure channel stability.
3. Difficult working conditions in the wet soils surrounding the improvement section.
4. Compressible foundations beneath the drop structures.
5. Special measures to control construction sedimentation.
6. Detailed site investigation requirements.

Fish and Wildlife

The fish and wildlife aspects of the watershed, particularly in the construction area, were determined and evaluated by several agencies. The Maine Department of Inland Fisheries and Game, the U. S. Fish and Wildlife Service, and the U. S. Soil Conservation Service made field investigations and prepared reports as to present types, quantity, and quality of fish and wildlife resources in the watershed. Using this data as a base, these agencies prepared evaluation reports on anticipated impacts of the proposed project on fish and wildlife resources.

A biological study consisting of sampling the benthic invertebrate community is presently underway. Organisms such as mayflies, caddisflies, stoneflies, scuds, worms, snails, etc., have typical clean water assemblages and are very sensitive to water quality changes. These invertebrates will provide information on what, if any, disruption the construction will cause, how fast the stream recovered, and if construction improved or hurt the stream habitat. This phase of the study will determine the baseline conditions by collecting bi-monthly the organisms from above, within and below the proposed construction area. This type of study was proposed by the U. S. Fish and Wildlife Service. Preliminary steps are underway for a similar survey which will monitor fish and wildlife.

The sponsors used these reports in evaluating their objectives in terms of the effect on fish and wildlife. The proposed project takes into consideration many of the suggested modifications and mitigative measures as well as emphasizing the many beneficial aspects to fish and wildlife. The sponsors and the contributing agencies continually coordinated their efforts in order to develop a plan with an overall beneficial environmental impact.

Forest Land

Information on the hydrologic condition of the forest land in the watershed and the reasons for the present hydrologic condition were obtained from a series of systematically selected observation plots. This information served as the basis for developing precipitation-runoff curve numbers and land treatment needs for forest land. The data obtained included measurements of the litter and humus layers, determination of soil type and other hydrologic factors, and recording the presence of disturbance factors such as fire, grazing, cutting, logging, and abnormal infestations of insects or diseases which might adversely affect hydrologic condition or increase fire hazard.

Forest fire protection is provided by the Maine Forest Service in cooperation with the U. S. Forest Service through the Clarke-McNary Cooperative Control Program (C-M2). Additional measures are not needed since the protection given exceeds the established watershed standards. The average annual burn for the watershed is 0.005 percent of the forested area protected. The state-wide average annual burn is 0.02 percent. The fire loss index goal is 0.05 percent state-wide and for the watershed. There may be a slight increase in the fire hazard as approximately 85 acres will be planted to coniferous tree species. However, the present degree of protection afforded is adequate to meet any increased hazard and risk resulting from project installation activities.

Archeological, Historical, and Unique Scenic Resources

Dr. David Sanger, Associate Professor of the Department of Anthropology of the University of Maine at Orono and a member of the Maine Historic Preservation Commission, made a study of the construction area to determine the possible presence of any archaeological resources. A field survey was made from the outlet of Lake Winnecook to a point two miles downstream on Twentyfive Mile Stream. The study includes a review of existing records and interviews with local "relic collectors." No archaeological values were discovered.

As of June 3, 1975, there were no known properties within the watershed listed in, or eligible for the National Register of Historic Places. The "Maine Historic Resources Inventory," published by the Maine Historic Preservation Commission in August 1974, lists the following historic building within the watershed:

"QUAKER MEETING HOUSE - Unity, Maine, (1827), Private

A serenely plain wooden meeting house which reflects in this architecture the beliefs of the Quakers who constructed it."

The meeting house will not be affected by the proposed project.

The area is not uniquely scenic.

Any values found in the future will be handled as stated in Public Law 86-523, National Reservoir Salvage Act; and Public Law 89-665, National Historic Preservation Act.

LIST OF APPENDIXES

Appendix A - Project Map

Appendix B - Plan Map

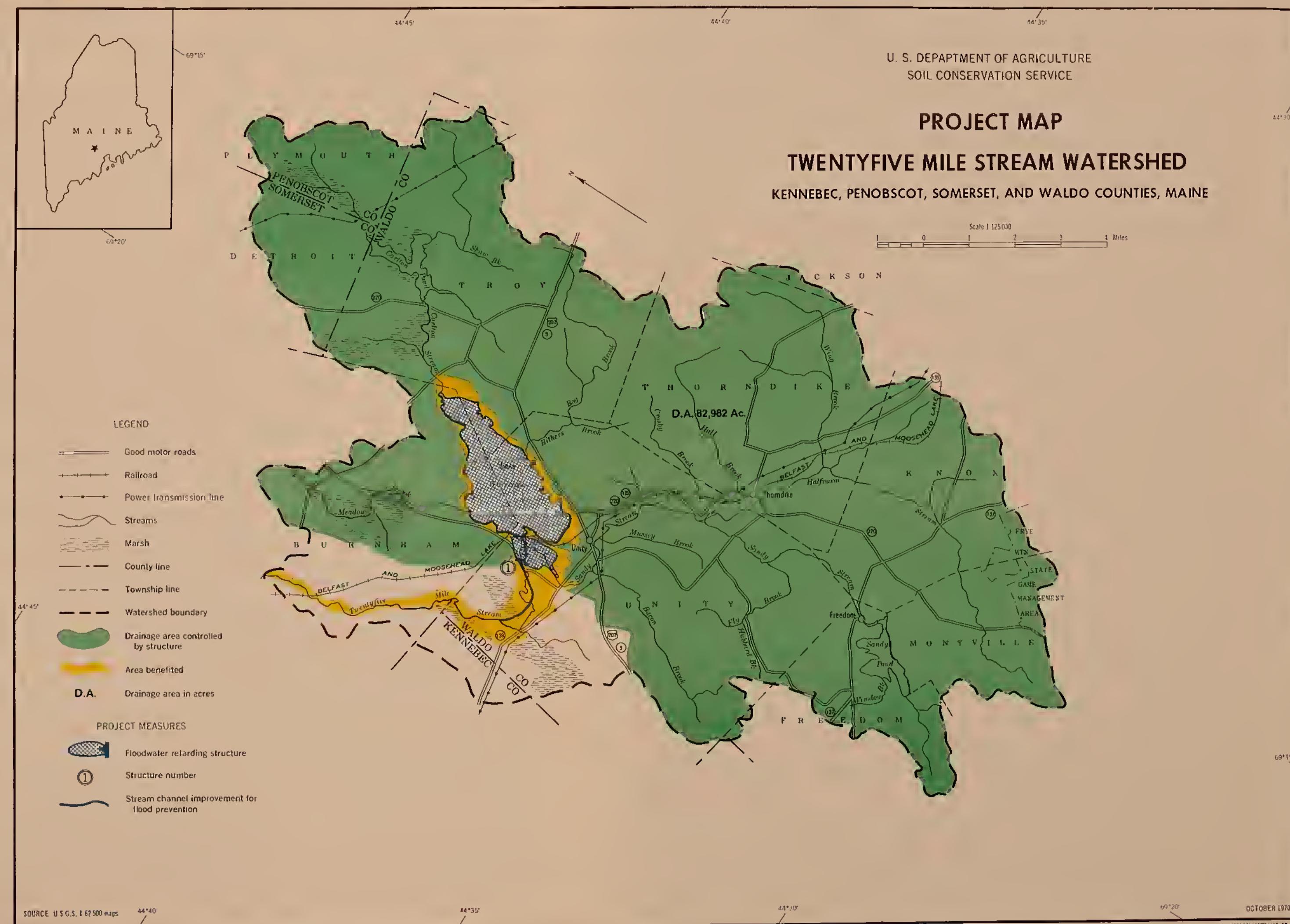
Appendix C - Condensed Profile

Appendix D - Species Names

APPENDIX A

PROJECT MAP

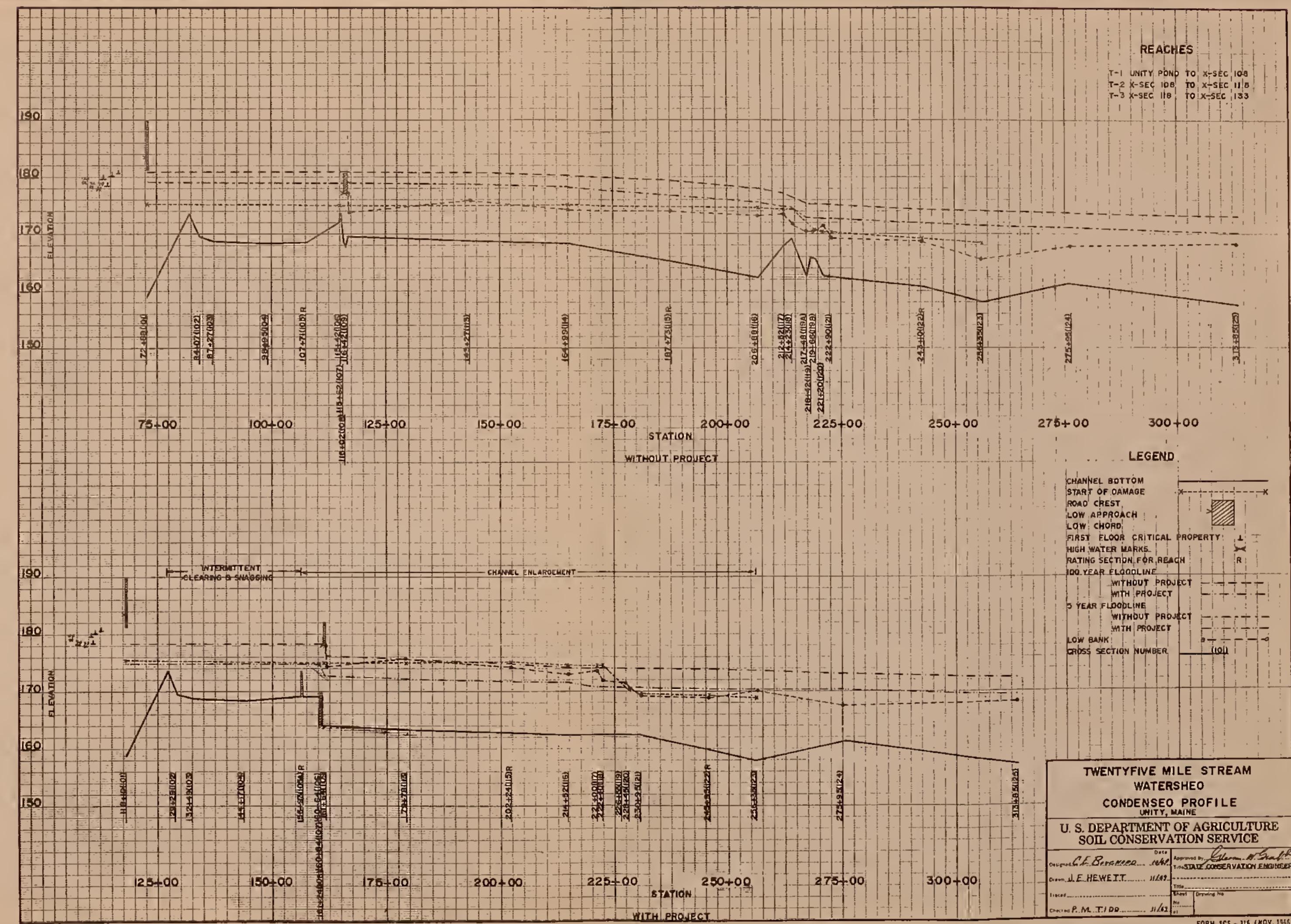






APPENDIX C
CONDENSED PROFILE





APPENDIX D

SPECIES LIST

SPECIES MENTIONED IN NARRATIVE*TWENTY-FIVE MILE STREAM WATERSHEDINVERTEBRATES

Caddisfly - or. Trichoptera
Mayfly - or. Plectophora
Scuds - or. Amphipoda, *Gammarus* spp.
Snails - cl. Gastropoda
Stonefly - or. Plecoptera
Worms - ph. Annelida

BIRDS

American goldeneye - *Glaucionetta clangula americana*
Black duck - *Anas rubripes*
Bluewing teal - *Anas discors*
Greenwing teal - *Anas crecca carolinensis*
Ringnecked duck - *Aythya collaris*
Ruffed grouse - *Bonasa umbellus*
Woodcock - *Philohela minor*
Wood duck - *Aix sponsa*

FISH

American smelt - *Osmerus mordax*
Brook trout - *Salvelinus fontinalis*
Brown bullhead - *Ictalurus nebulosus*
Chain pickerel - *Esox niger*
Fall fish - *Semotilus corporalis*
Golden shiner - *Notemigonus crysoleucas*
Land locked salmon - *Salmo salar*
Large mouth bass - *Micropterus salmoides*
Small mouth bass - *Micropterus dolomieu*
White perch - *Roccus americanus*
White sucker - *Catostomus commersoni*
Yellow perch - *Perca flavescens*

MAMMALS

Beaver - *Castor canadensis*
Fisher - *Martes pennanti*
Mink - *Mustela vison*
Muskrat - *Ondatra zibethica*
Otter - *Lutra canadensis*
Raccoon - *Procyon lotor*
Red fox - *Vulpes fulva*
Skunk - *Mephitis mephitis*
Snowshoe hare - *Lepus americanus*
Whitetail deer - *Odocoileus virginiana*

SPECIES MENTIONED IN NARRATIVE*
TWENTY-FIVE MILE STREAM WATERSHED
Page 2

TREES

American beech - *Fagus grandifolia*
American elm - *Elmus americana*
Apple - *Malus spp.*
Balsam fir - *Abies balsamea*
Bigtooth aspen - *Populus grandidentata*
Black ash - *Fraxinus nigra*
Brown ash - *Fraxinus nigra*
Gray birch - *Betula populifolia*
Hemlock - *Tsuga canadensis*
Northern white cedar - *Thuja occidentalis*
Quaking aspen - *Populus tremuloides*
Red maple - *Acer rubrum*
Red oak - *Quercus rubra*
Silver maple - *Acer saccharinum*
White birch - *Betula papyrifera*
White spruce - *Picea glauca*

CROPS

Alfalfa - *Medicago sativa*
Corn - *Zea mays*
Potato - *Solanum tuberosum*
Timothy - *Phleum pratense*

OTHER PLANTS

Aster - *Chrysopsis spp.*
Beggar tick - *Bidens spp.*
Blackberry - *Rubus allegheniensis*
Bluejoint - *Calamagrostis canadensis*
Bulrush - *Juncus spp.*
Buttonbush - *Cephalanthus occidentalis*
Cattail - *Typha latifolia*
False hellebore - *Veratrum spp.*
Goldenrod - *Solidago spp.*
Leather leaf - *Chamaedaphne calyculata*
Raspberry - *Rubus idaeus*
Red osier dogwood - *Cornus stolonifera*
Silky cornel dogwood - *Cornus amomum*
Sweetgale - *Myrica gale*
Viburnum - *Viburnum spp.*

* This list does not represent an in-depth inventory of species present. It is a listing of the animals and plants mentioned in the work plan and EIS narratives.

